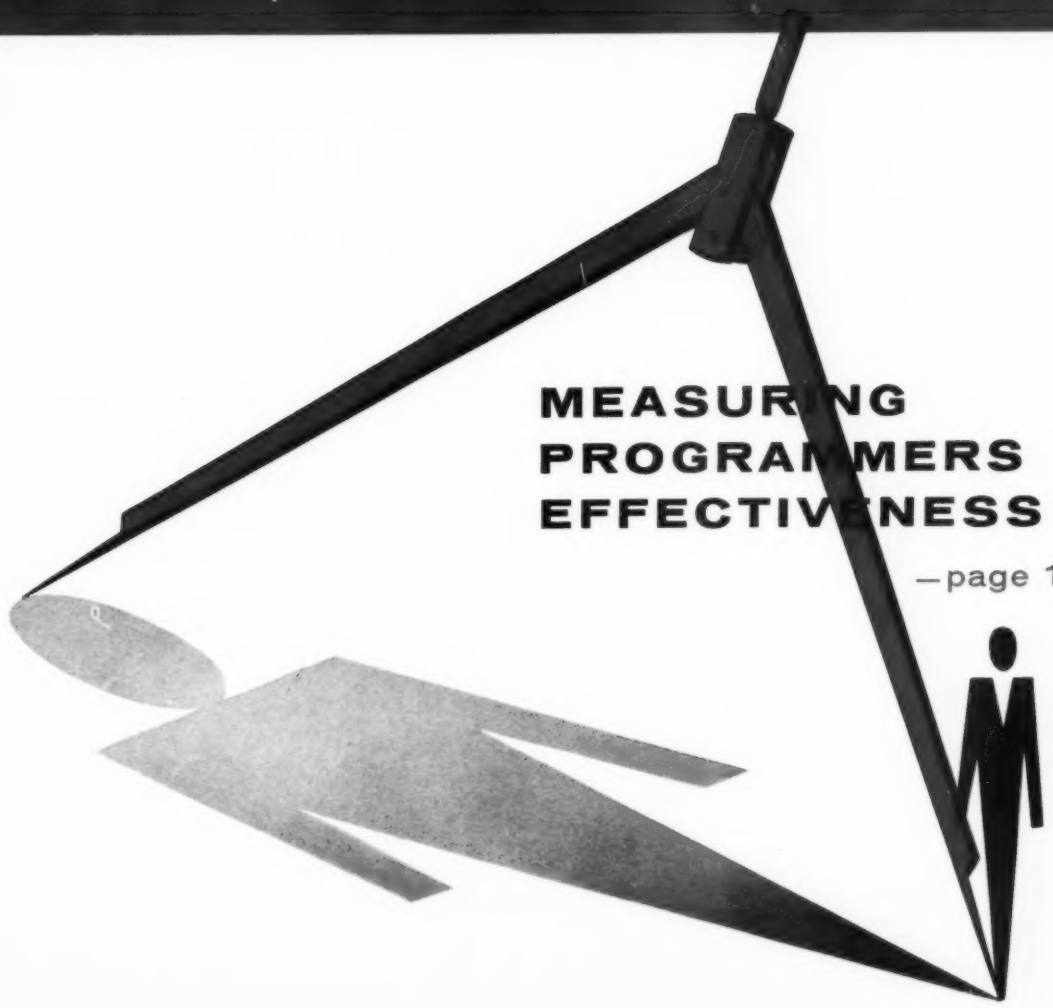
AUGUST 1960

DATA PROCESSING

THE MAGAZINE OF AUTOMATIC OFFICE METHODS AND MANAGEMENT



MEASURING PROGRAMMERS EFFECTIVENESS

—page 15

- Improve Your Reports—page 11
- The Relationship of Information to Data Processing—page 21
- The Unit Record-Core of Data Processing—page 33

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DATA
PROCESSING

Volume Two • Number Seven

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Also publishers of The Punched Card DATA PROCESSING Annual (Applications Volumes and Reference Guide) and Data Processing Handbooks. Application for 2nd class entry pending at Detroit, Michigan.

OBSERVATIONS . . .

from the publisher . . .

WEBSTER DEFINES DATA as "a group of facts or statistics." Processing is defined as "the use of a series of actions or operations definitely conducing to an end."

Every organization, large or small, must continuously "apply a series of operations to facts or statistics toward a definite end." Therefore every organization, large or small, has a data processing function.

When the volume or the repetitive nature of these data become sufficiently large, the activity is assigned to specialized personnel with a director who can justifiably be called "the data processing manager."

But you may ask, "Why this academic consideration of terms?" A clear use of terms promotes increased understanding.

We are pleased to note that in the past year there has appeared to be a substantial improvement in data processing semantics. However, only recently we saw data processing defined editorially in an office magazine as "merely the handling of paperwork by some sort of a system." Obviously this is contradicted even basically by Webster's definition which makes no reference to paperwork but rather to facts and statistics. If data were "only paperwork" this field would be much more limited than it is in reality. Actually data processing methods strive to minimize paperwork.

Should the term data processing be limited to particular types of equipment? The definitions already stated clearly suggest that it should not. Punched card systems are data processing, so are those employing paper tape, computers and all media of data storage, retrieval and communications.

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AUTHORS

G. EDWARD BISSELL *("Measuring Programmers Effectiveness")* graduated from The University of British Columbia, Vancouver, B.C. with a B.Com. degree in 1951. During 1951 and 1952 he gained auditing and accounting experience in Edmonton, Alberta with Winspear, Hamilton, Anderson and Company, a firm of chartered accountants, and with The Royal Bank of Canada.

Since 1953 Mr. Bissell has served with the Royal Canadian Air Force in various responsible supply officer positions, and since 1957, has been a Systems and Programming Analyst with the RCAF's large scale electronic computer installation in Ottawa, Ontario. He has written several computer programs and developed the installation's standard operating procedures manual covering programming techniques and procedures.

During evening lectures since 1956 Mr. Bissell has earned an M.A. degree in Economics from The University of Ottawa. His thesis, entitled "An Economic Approach to Office Automation," entails a comprehensive management approach to office automation in light of economic principles.

BENEDICT KRUSE *("Improve your Reports")* is general manager of Frank Associates. He supervises a staff of 14 writers, located in eight cities across the country, who prepare over 600 magazine articles a year on data processing and systems.

Mr. Kruse was with the New York Times for seven years, concurrently studying journalism at Columbia University. For the last three years on the Times stint he was assigned to their United Nations Bureau.

Mr. Kruse has written about 1,000 feature articles on data processing since he joined Frank Associates in 1950. He screened and trained his staff personally, which has given him an excellent insight into teaching people to write about data processing systems. The great bulk of the work done by the company takes the form of reports to management on data processing.

He is the author of a basic textbook on punched card accounting, *Automation Accounting*, which is used by the Automation Institute of America throughout its nation-wide school system.

ROBERT M. FLANAGAN *("Outline for Conversion")* came to Dean Witter & Co. in early 1953 after varied experience in all types of punched card accounting. He has attended City College of New York and Pace College. At present, he is Assistant Office Manager in charge of installing an IBM 7070 in September of this year. Mr. Flanagan holds membership in the National Machine Accountants Association, Purchase and Sales, Tabulating Association of Wall Street, Association for Computing Machinery and Guide.

EDWARD A. TOMESKI *("The Relationship of Information to Data Processing")* is the data processing research assistant for Socony Mobil Oil Company. He is responsible for equipment research and evaluation, applications research and evaluation, advanced techniques and applications development, technical assistance, and equipment advice, education and training course development and presentation. He has done Ph.D. work in economics at New York University, graduate work at Columbia University, and undergraduate work at the University of Maryland and Fairleigh Dickinson University. Mr. Tomeski holds a number of offices in The Institute of Management Sciences, including those of vice-chairman of the International College on Managerial Economics and assistant editor of its Bulletin. He is also active in the Systems and Procedures Association, American Institute of Industrial Engineers, and Association for Computing Machinery.

McLAIN B. SMITH *("The Unit Record—Core of Data Processing")*, IBM vice president and group executive, joined IBM in 1933. He subsequently served in various sales executive positions, including branch and district manager.

In 1953 Mr. Smith was promoted to assistant to the IBM vice president in charge of Federal Government activities, with headquarters in Washington, D.C. In 1955 he was made director of these activities. He later served as director of plans and controls for IBM's Data Processing Division, and in 1957 was made assistant general manager of the division.

Mr. Smith was elected an IBM vice president in 1958, and later that year was appointed general manager of the Data Processing Division and a member of the company's Corporate Management Committee. In 1959 Mr. Smith was named a group executive for the IBM Data Processing, Federal Systems, and Supplies Divisions, and The Service Bureau Corporation.

Mr. Smith served in the Army Air Force during World War II, attaining the rank of major. He is an alumnus of Fordham University. ■

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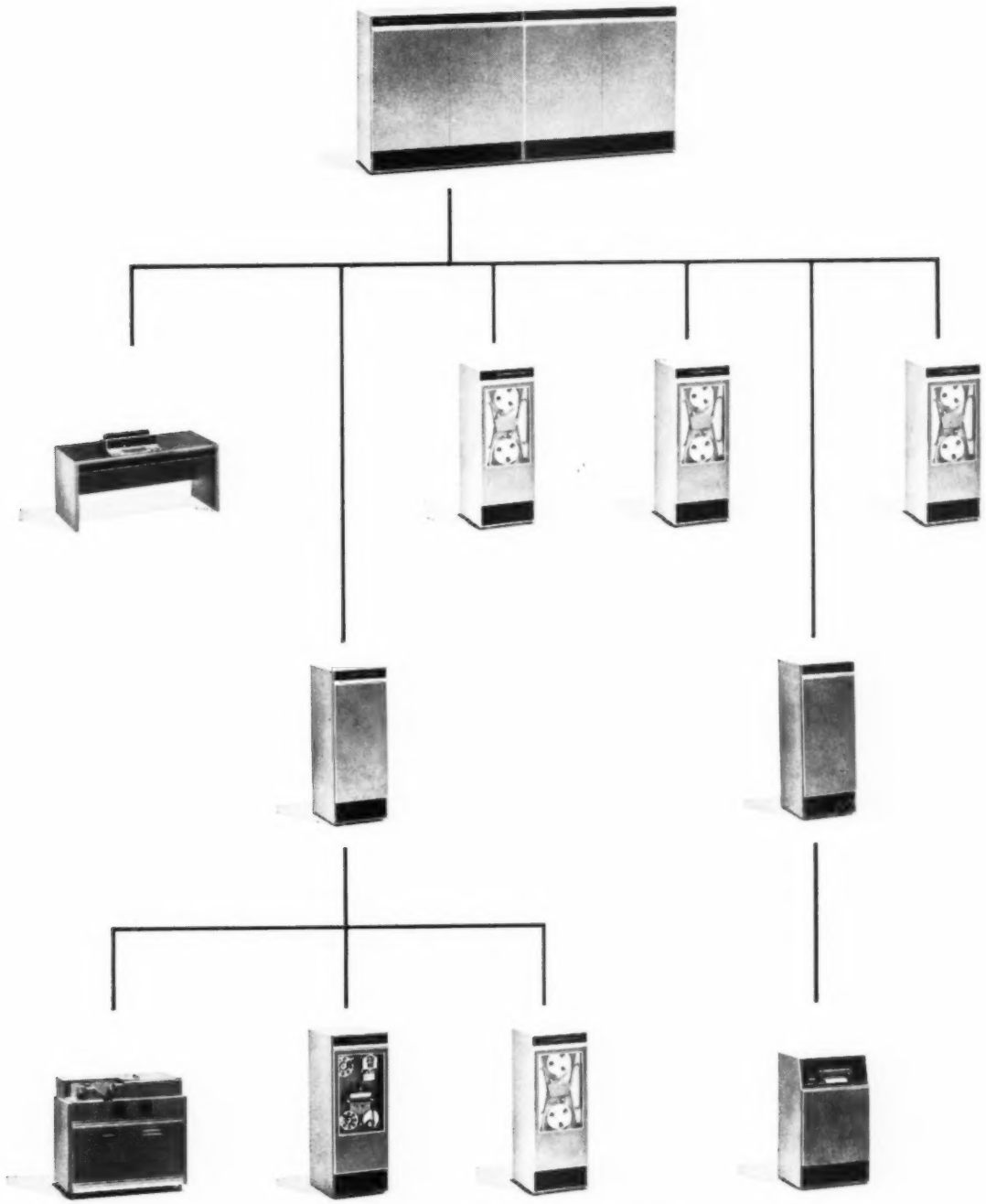

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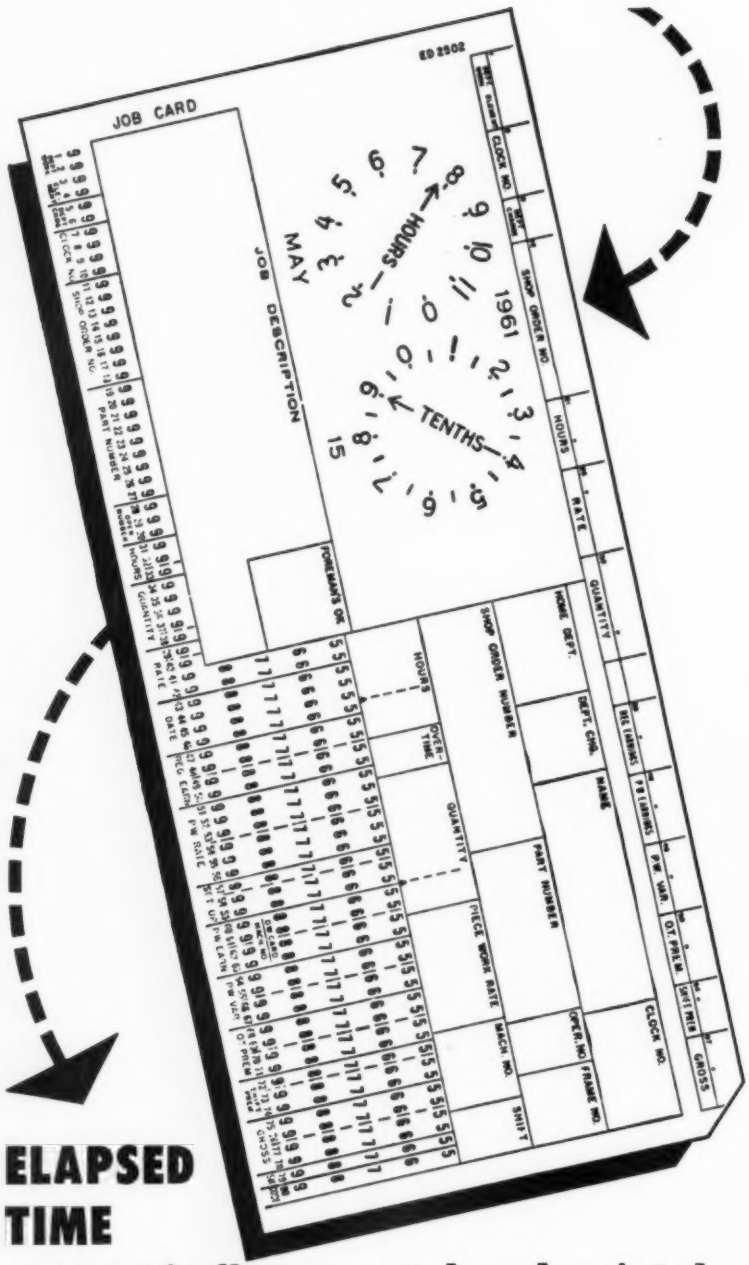

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Comments from Readers

Data Input Methods

Kitchener, Ontario

Dear Sir:

In the April/May issue of DATA PROCESSING, Mr. Joseph R. De Paris included in his column reference to a number of data processing input methods.

Included in these references were the firms of Stromberg Division of General Time; General Electric; Standard Register; and American Electronics.

Would it be possible to obtain the addresses of these firms, as we are very interested in obtaining information about these different forms of data input?

H. C. Chappel

In the event that other readers would like these addresses, they are:

Stromberg Time Corp., Main and Elm Sts., Thomaston, Conn.;

General Electric Co., 13430 N. Black Canyon Highway, Phoenix, Ariz.;

The Standard Register Co., Dayton 1, Ohio; and American Electronics Inc., 1725 W. Sixth St., Los Angeles 17, Calif.

Scope Interest

Williamsport, Pa.

Dear Sir:

Congratulations on your excellent article, *"The Scope of Data Processing,"* which appeared as the centerfold insert of the April/May issue.

We would be interested in knowing if reprints of this report are available. It is felt that we would be contributing a service in presenting such reprints to the membership of the West Branch Data Processing Association and to the management executives of firms in this area. . . .

Howard A. Brockway
President
West Branch Data Processing Association

We have had many requests for reprints of this special feature. Reprints are available at $1.25 each. Quantities of 50-100: $67.85; 500: $81.50; 1000: $105.50.—Ed.

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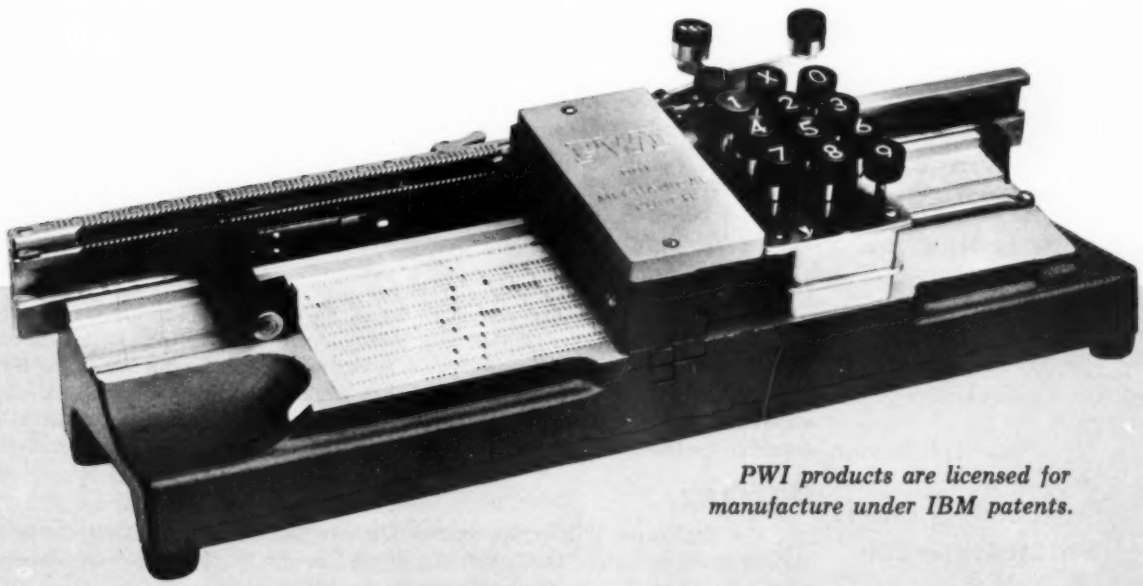

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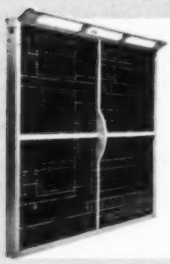

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NEWS SUMMARY

GENERAL

The American Management Division of AMA will be known henceforth as the Administrative Services Division. In the past year the divisional program included more than 80 seminars and an annual conference. Meetings which were held in New York, Chicago, and Los Angeles drew more than 1,700 office and administrative executives.

Problem Solvers Problems

Computer scientists and engineers — whose business is solving problems — agree they have *"terrible problems."* Some 45 of the best in the business — including theorists, designers, programmers, operations researchers and numerical analysts — put their heads together in a day-long session at the University of Michigan. Most of them are instructing in seven special two-week computer courses *(two introductory and five advanced courses on all facets of computer technology)* to 275 men — and a few women — representing industrial, governmental, military, and computer manufacturing groups. These summer session courses are the only ones dealing with aspects of computer design, use and programming.

Tape Guaranteed

Datamatic Division of Minneapolis-Honeywell is now guaranteeing their magnetic tapes against damage. They are the first computer manufacturer to guarantee that their data processing equipment will not damage tapes during processing; if breakage should occur in a tape it will be replaced without charge, no matter what its age.

IBM has formed a Manufacturing Research Laboratory to develop advanced techniques for manufacturing future data processing equipment. This is the first laboratory in the company devoted entirely to manufacturing research.

Savings via Credit Card

A new type of savings account that employs the basic concept of the *credit card* is being used by Home Federal Savings and Loan Association of San Diego, Calif. In place of the traditional savings passbook, the customer receives a wallet-size, plastic Savercard embossed with his name and account number. With the card serving as identification, the saver can add to and withdraw from his account more conveniently and quickly than with a passbook.

The customer no longer needs to fill in his name and account number on deposit and withdrawal slips, this data being imprinted directly from the Savercard by the teller. The customer receives a receipt of the transaction at the time an addition to his account or withdrawal is made; each quarter he is mailed a statement that lists each transaction made during the period, the amount of earnings credited, and the current balance of the account.

MILITARY

Publication File

The Registered Publication System Department of the U. S. Naval Security Station in Washington, D. C., officially turned over control of its vast store of vital *military publications* to an electronic computer.

The RPS, which operates through a network of 13 issuing offices ranging from Pearl Harbor to London, is responsible for the distribution and accounting of approximately four million publications yearly to 2,600 commands — ashore and afloat. The U. S. Navy has been accounting for registered publications for over 100 years. The new Univac Solid State computer will maintain master files listing publications held by each command. The system's speed is expected to effect large savings in operating costs.

An S-C 3060 medium speed electronic printer has been delivered to the U. S. Navy Postgraduate School at Monterey, California. The printer will be used by Project NANWEP, a Naval Weather Service Research Unit using high speed digital computers in the development of new *naval meteorological techniques.*

The Air Force world weather data processing computer for *advance weather reports,* involved in all missile launchings at Cape Canaveral since 1959, was demonstrated at the Military Electronics convention at Washington, D. C. The computer, a Bendix G-15, performed just as it does at the Cape, where it receives, by teletype, raw weather information recorded along the free world's largest instrumented range for instantaneous processing.

Improve Your Reports

How to Make Your Writing Get Attention, and Keep It.

THE DAILY LIVES OF MILLIONS OF PEOPLE will ultimately be affected by the descriptions and explanations about automated machines which they receive from those of us who are professionally engaged in this field.

We who are in this business know what we have. But, this field is so fascinating that it is easy to lose yourself in it.

This was acceptable when we worked in data processing rooms that were stuck down in the basement somewhere to be kept out of harm's way. We could become immersed in our machines and systems — do our jobs and not worry about anyone else.

But, that time has past. Automatic management tools are becoming one of the most dynamic, driving forces of our economy. The major portion of our population will eventually have their lives affected by our activities in data processing.

Unequivocally, we can say we have scored a thumping success. Historians are already referring to this movement with which we are associated as a Second Industrial Revolution.

During the coming decade, data processing managers will be changing the face of American business. People will do things differently because our machines will have helped to prove that the new ways are better.

We know that we will be responsible for some major changes in the business community. In turn, this position of leadership places an important burden on us.

The changes we will help bring about can result in confusion or enlightenment. The choice is up to us.

A large measure of our success in making data processing automation a benefit to our employers and our communities lies in our effectiveness in telling them about what we are doing. In the future, it will become a basic responsibility of the data processing manager to be able to express himself intelligently to management; to people in other phases of business, industry and government; to the hundreds of thousands of new employees who will be recruited for data processing work, and finally, to the general public.

The time has come when every data processing manager must be a part-time professional writer. We have this responsibility now. Many managers are already putting more words on paper than professional novelists. The problem is that too many look on their writing assignments as acts of drudgery.

It Isn't Easy

And in too many cases, the results look like drudgery. Certainly, every manager wants to improve the caliber of the reports he writes. This is actually the first ingredient to better report writing — you have to want to improve. You must realize that you have a vital service to perform. Realize also that a large measure of your own success will

(continued on next page)

By Benedict Kruse

depend on the impression you make with your written reports.

Once you have established in your own mind that there is a valid reason for you to write well — and when you have convinced yourself that you want to do it — you have acquired the most important basic quality you need to become a competent writer.

Let's consider the prime requirements of any good writing career — literary, business or otherwise.

The most important thing is the drive, or desire, which we have already discussed.

You Have Advantage

Next in importance is a thorough grounding in your subject. You have a big head start over the purely literary writer. You know your business or you wouldn't have your job. You enjoy an expert position which very few writers ever acquire.

The last of the basic elements is known by a lot of elusive terms, including *"talent," "creativity," "The Gift," "soul,"* and many others.

There's no getting away from it. The so-called *"gifted"* writer has a big head start.

Discipline and Practice

However, from solid experience I can tell you honestly that most of the people who have this basic *"gift"* never really make the grade as professional writers. I can tell you, too, that this *"gift"* is usually overrated. Too many people who have the basic talent needed to become qualified writers lose it through misuse — laziness, if you will. In other words, talent alone is not enough — not nearly enough.

The real ingredient which makes or breaks a professional writer is discipline. In writing, just as in any other field, there is a dexterity which you get with practice. In the area we are discussing, this practice is, by far, the most important for success.

Thomas Edison once defined creation as *"1% inspiration, 99% perspiration."* Just about the same proportions apply in the work we are discussing.

Please notice that the references here have been to professional writing. I have done this purposely. The way I see it, if you are a data processing manager today, writing is part of your professional responsibility. You will do better at it if you approach it professionally.

In taking this professional approach to your writing work, let's start with the obvious: Writing is hard work. I can tell you that one of the most lonesome feelings in the world is to sit and stare at a blank sheet of paper.

This is where discipline comes in. For every writing assignment you undertake, put yourself on a deadline. Schedule your work and set a time limit. Even if you are convinced that what you are writing is terrible, keep at it.

The more words you put on paper, the easier writing will become for you. If you don't believe me, count them. After you have written about 50,000 words under a self-disciplined, continuing program, you will find that your thoughts flow more easily and that you are expressing yourself more clearly. This is one place where there are no shortcuts. The muscles up there between your ears need a certain amount of exercise. After that, they are easier to flex.

There are some definite shortcuts, however, in the process of organizing the material you want to present. Here is the formula:

Know Your Audience

Always write to someone — never about something.

The key to any good piece of writing is that the reader must be able to identify himself with it.

Think about this from your own experience. You have heard it said time and again that the television networks are loaded with westerns and whodoneits primarily because the average man and woman can easily project themselves in the roles of the hero and the heroine.

We read about travel and adventure because most of us long to do these things.

In your writing, the common denominator of reader interest is business. You are presenting material directly connected with the livelihood of your reader. So, you have a good head start in attracting his interest.

The trick now is to bring this material to the level where it will have its greatest impact. This business of reader interest cannot be stressed too strongly. It is the real key to effectiveness for you.

In our own organization, where every member of

Construction of report writing is like an inverted pyramid— the largest section, and most important, is the lead. This is the *Must*. Other sections may be cancelled, depending upon the type of report and the ultimate reader. Elimination of sections starts at the bottom. Obviously top management is not interested in many of the details that would interest those directly connected with an operation.

the staff is a professional writer before he joins us, the greatest problem we face is in training people to slant — or direct — copy for a specific audience. The great emphasis we place on this phase of writing is the largest single factor in our success.

Carry this business of analyzing your readership as far as you like. You can't overdo it. For example, before we tackled our recent assignment on the text: *Automation Accounting,* for the Automation Institute of America, we actually sat down and wrote a description of more than 1,000 words on our typical reader. This description was thoroughly worked out and agreed upon before we ever started on Chapter I. It remained throughout the project as the basis for judgment of the text materials.

It will pay each of you to stop briefly and consider the audiences to which you write. Then analyze what it is they are most anxious to hear from you. Here are a few examples:

Top Management

People in this category are interested primarily in end results. Putting details of how a system works into a report to top management will be wasteful. Interpret your reports to this group in terms of what will be accomplished, how much it will cost, and what will be saved or improved.

Operating Management

Again, don't burden this group with details of how you conduct your machine operations. They assume you know how to do this. By writing reports which show that you also assume you know your business, you are helping to build your own stature. In reports at this level, you inter-relate data processing operations with the functions of other departments — remembering that the prime interest of your readers will be in where their own operations fit into the picture.

Data Processing Employees

Try to have every piece of paper you generate to your own employees help to upgrade their attitudes and actions. Most of the writing in this area will be in manuals and directives. Be careful to avoid issuing written materials which will help create a generation of button-pushers. In every case, try to help your employees know why they are doing a given job a certain way. Be sure they realize what they are accomplishing in handling the job. In writing to your own people, no matter what method of operation you use, *appeal to their intelligence.*

Before you start a writing project, then, line yourself up with a good mental focus of who will be reading it.

Next, be sure you have all the facts you need at hand so that you can weigh them — in terms of their audience interest — before you start to write. Depending on your own preferences, you can either review the facts mentally or you can jot them down in outline form. Just be sure you have considered the whole picture before you begin.

Within the body of the report itself, there are three main areas to consider. I will review them in a professional writing sense:

The Lead

The opening, or *"lead,"* is the most vital portion of any written material. This, basically, is where your reader decides whether or not he will go on. This is also the area in which most business writing is at its weakest.

To strengthen your introduction, start with a thorough sifting of all the facts on which you are going to report. Boil them all down until you have the one salient fact which is of greater interest to your reader than any other single item. When you have done this, you have your lead.

For example, a typical report on a data processing situation, — in which this procedure had not been followed — might read this way:

"The purpose of this report is to outline the progress of new procedures for handling accounts payable on punched card data processing equipment."

By the time your reader gets to the end of the first sentence, he is skimming. You are apt to lose him before you get to the salient facts. Here is one way in which you might accomplish the same purpose more effectively:

"Mechanized data processing is saving the company approximately $2200 per month in the handling of accounts payable. This report will outline the procedures which have led to these savings."

The Body

Once you have attracted attention with a salient fact lead, you have to hold it by telling your story in a logical *continuity.* Fortunately, in writing about data processing, you have your continuity pretty well worked out for you. Everything you do is laid out in a step-by-step system. Tell your stories that way. Start at the beginning and go to the end.

Conclusion

Every report should also have a logical *conclusion.* In winding up your report, imagine that your reader is asking you a simple question:

"What would you like me to do?"

Be sure the last paragraph of your report tells him this.

For my part, I would like data processing managers to be able to do a better job of telling their story so that more people will listen. From this improved ability, I believe businessmen and the general public will be helped in learning to live with automation.

By Robert M. Flanagan

Outline for Conversion

Setting Up a Conversion Plan for Electronic Data Processing.

UNFORTUNATELY, there is no master plan set-up which, if followed, guarantees a successful installation of an electronic computer. Fully realizing this, we at Dean Witter & Co. have designed a semi-formal plan to guide us in installing the first IBM 7070 in the investment banking industry.

The following outline contains only the major highlights of this plan so as to permit changes for individual needs.

1. General Section — organizational needs
- a) Staffing of electronic data processing department
- b) Orientation program for personnel

2. Educational Programs for Staff
- a) Manufacturer's school
- b) Standardization of programming techniques

3. Review of Present Procedures
- a) Flow charts and explanations
- b) Origin, copies and distribution of source documents
- c) All files—contents, sequence, and purpose of sequence
- d) Reports required—number of copies and distribution
- e) Areas to be covered —
  1) Changes and method of changes
  2) Effective control over changes

4. General Plan for Change-Over
- a) Degree of control
- b) Transmission of source documents
- c) Design of system—broad outline
- d) Tentative master work schedule
  1) Applications and target dates assigned to programming staff
  2) Periodic progress report meeting with staff
- e) Proposed organization of data processing center

5. Design and Approval of New Forms
- a) Source documents } number of copies and
- b) Final reports } distribution

6. Develop Computer Procedures
- a) Uniform codes and symbols
- b) Tape labels
- c) Basic utility routines needed (sorts-merges-edits)
- d) General and detail flow charts
- e) Coding
- f) Testing and debugging procedures
- g) Run books—complete information on application

7. Clerical Functions
- a) Understanding of new procedures to insure smooth flow of work
- b) Review of external controls

8. E. A. M. and Auxiliary Electronic Equipment — Manuals, control panels, etc.

9. Computer Installation Facilities
- a) Location—tape library, files, etc.
- b) Site preparation—power, air-conditioning, machine layout, etc.

10. Final Preparation
- a) Trial runs
- b) Schedule of work
- c) Basic files-to-tape
- d) Controls for conversion
- e) Displaced equipment; space relocation

11. Educational Program for Affected Personnel
- a) Seminars for department heads and supervisors
- b) Computer operators
- c) Clerical personnel

12. Paralleled Operation and Final Check-outs
- a) Comparison of results
- b) Modification of programs (where necessary)

13. Conversion Proper and Follow-up

This is a flexible administrative approach to an installation, and is only intended as a guide. Insertion of additional controls or steps is left to the imagination and requirements of each individual who is responsible for the successful installation of a computer.

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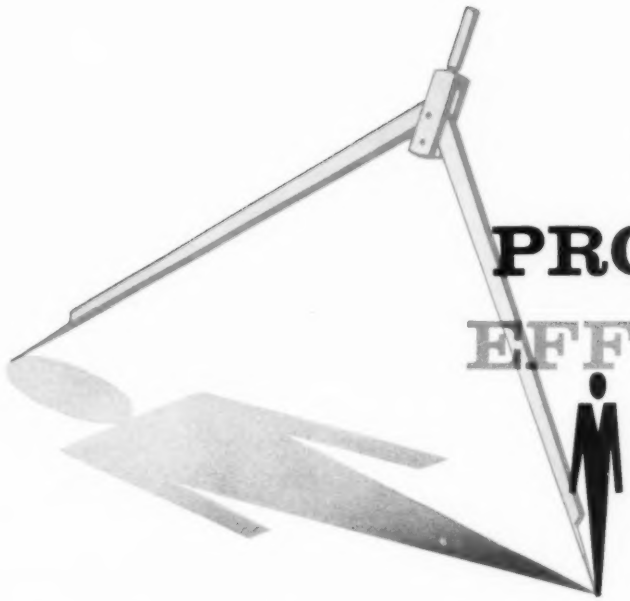

MEASURING PROGRAMMERS EFFECTIVENESS

A system of measurement providing closer controls and adequate supervision will bring benefits to management, and to programmers.

AN ELECTRONIC DATA PROCESSING INSTALLATION forms an integral part of a large scale integrated data processing system. The primary purposes of any electronic data processing installation are to effect net savings through the reduction of costs, and to provide more effective management data through the simplification of procedures. In order to extract the greatest potential from the installation of electronic equipment, an organization should give careful consideration to the methods of attaining the maximum utilization of resources.

One of the areas in which resources utilization may be abused is that of programming costs. Programming costs comprise a significant portion of the installation and operating costs of any electronic data processing installation. Experience indicates that controlling programmers work effort has been one area in which management has been reluctant to exercise stringent control. Management may be presumptious in expecting to establish more stringent programming control through the use of rapidly developing common business languages for automatic programming of data processing procedures, however, management should not over-estimate the use of standard compiling systems in increasing programmer effectiveness. There will still be a realistic need for years to come for good old fashioned capable supervision. Therefore, this may well be one area where closer control could substantially improve a data processing system and reduce costs.

Unless management establishes a method for allocating work effort, for distributing work loads, for evaluating programmers performance, and for scheduling work and predicting work requirements, good supervision will not be possible and programmer efficiency will not be high. Programmers respect a supervisor who gives them a job and can tell them what is expected of them in the performance of that job. The supervisor is respected if he does not hound his staff and is not continually molesting them in his supervision. Good supervision is little supervision.

(continued on next page)

By G. Edward Bissell

However, good supervision is not possible without some method of assessing the workload, without some method of assessing the capabilities of the programmers, and without some method of distributing the workload amongst the staff. This task may be eased somewhat by a suitable work measurement program.

A good work measurement program involves the establishment of work norms or standards of work measurement to measure work performance, and as a basis for calculating programmer requirements. Work performance or achievements are measured against standard values in all walks of life. The long distance runner is judged on the time he takes in running a number of miles. The independent trucker is compensated for his services by the volume of wheat, in bushels, that his truck is capable of carrying. The architect's fees for designing a building are based upon the quality of work which he has proven capable of performing. In each case, the services of the individuals cited are compensated for on the basis of a standard value of work performance. By the same token, a programmer may have his work assessed on the basis of a standard of work performed.

Establishing Standards of Performance

Programmers are engaged in a variety of jobs, therefore, their standards of work measurement should reflect the variety of tasks they encounter. It is not sufficient to say that a programmer is responsible for coding X number of instructions. One program may require an extensive number of coded instructions with relatively little logic development, while another program may require extensive logic development with relatively little coded instructions. Unless there is some way of measuring the amount of work required on each program, then the total work effort performed by the programmer cannot be assessed and standards of comparing one programmer with another cannot be established. In other words, the job of programming must be broken down into numerous elements other than just the coding of instructions. The measurable tasks or functions that go into the development of a program are as follows:

Function	Unit of Measurement
Logic Development	
Develop English narrative	diagram blocks
English logic review	hours
Develop file content	fields
Programming	
Develop machine logic	blocks
Code instructions	instructions
Prepare file format layouts	files
Manuals preparation	hours
Programming assistance	hours
Instructional assistance	hours
Prepare output formats	hours
Debugging	
Pre-assembly preparation	hours
Desk checking	hours
Prepare test data cards	cards
Prepare program control cards	cards
Program debugging	hours

This list indicates the units of measure, norms, or standards of work measurement which may be used in measuring programming effort. The functional unit of each phase of program development is shown with what may be considered a suitable unit of measurement in assessing the programming effort that goes into each function.

Establishing the Present Level of Work Performance

Before any programmer requirements can be calculated, and before any work performance can be assessed, an analyst will need to develop the time consumption allowable for each function of program development. This element may be established by measuring the current time that each function requires in terms of its respective unit of measurement. This will involve measuring the total amount of productive work expended by programmers in the development of programs. Such an inventory of tasks[1] performed may be taken by the programmers themselves, using a form similar to **Figure 1**.

It is important to note that only productive work is measured. The more a programmer is annoyed with accounting for his time, and more particularly in accounting for non-productive time, then the less apt he will be in cooperating on a work measurement program. Unless a programmer's full cooperation can be attained, then a true assessment of actual productive work expended will not be obtained. The programmers must be made to understand that they are not being *put on the spot*. In order to get their cooperation, and not disturb their mental effort, they must understand that benefits from the survey will accrue to them as well as to the installation through giving their supervisors some method for assessing their work performance. If they are not ashamed of their work performance, then they need not fear the establishing of any standards which will result from the work measurement program. In other words, a thoroughly indoctrinated programmer will understand and be most helpful in implementing the program because he will realize that benefits will accrue directly to him.

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[1] The idea of taking a **task-inventory** of work performance has been taken from Frank M. Knox, **Integrated Cost Control in the Office**, McGraw-Hill Book Company Inc., New York, 1958, wherein the measuring of clerical work performance is discussed and a form is suggested for taking a task-inventory of clerical work performance.

TASK — INVENTORY OF PROGRAMMING EFFORT
SYSTEMS AND PROGRAMMING

Programmer:———— Date: From———— To————

Function	Unit of Measurement	Monday		Tuesday		Wednesday		Thursday		Friday	
		Volume	Time Consumed	Volume	Time Consumed	Volume	Time Consumed	Volume	Time Consumed	Volume	Time Consumed
Logic Development											
Develop English narrative	blocks										
English logic review	hours										
Develop file content	fields										
Programming											
Develop machine logic	blocks										
Code instructions	instructions										
Prepare file format layouts	files										
Manuals preparation	hours										
Programming assistance	hours										
Instructional assistance	hours										
Prepare output formats	hours										
Debugging											
Pre assembly preparation	hours										
Desk checking	hours										
Prepare test data cards	cards										
Prepare program control cards	cards										
Program debugging	hours										

Figure 1

The work measurement program should be carried over a period of time sufficient to allow a good sampling of work measurement in each stage of program development. Because of the many factors involved in developing an application, a work measurement program will more than likely take several months rather than several weeks. Additionally, it should probably extend over a complete application development regardless of how many programs comprise the application. Having secured a good sampling of work effort consumed, then an average time per unit of measurement may be established by dividing the total time consumed by the volume of units of measurement counted. The resultant standard values will be used to measure future programmer performance and to forecast programming effort required in an application.

Budgeting of Programmers Requirements

A budget forecast[2] of work effort required by program is created for as many months ahead as is desired using the form suggested in **Figure 2.**[3] The volume of work effort required in each function is summarized by program and is then translated into actual manpower requirements. The creating of such a budget requires an intimate detailed knowledge of the application by the system's analyst. The analyst will have this knowledge, provided that he has been closely associated with the development of the application from the time of, or shortly after, the inception of the need for automating the application. Therefore, he will be in a position to know how much programming effort is required for the application in terms of each function within each program.

The total manpower requirements are then modified by a factor which reflects the degree of complexity of each program. Such a complexity factor may be established by determining the characteristics of a program and weighing each characteristic according to the analyst's conception of its impact upon the complexity of the program. The characteristics of a program which affect its complexity have been described by Robert Boguslaw and Warren Pelton in a management game for programming supervisors entitled "STEPS," developed at the System Development Corporation, Santa Monica, California.[4]

At the time of creating a programmer's budget schedule, the analyst, after translating programming effort required into manhour requirements, may record these manhour requirements on a form

[2]The budgeting of programmers requirements is discussed by John Diebold in "Bringing Management to EDP", **Ideas For Management,** Systems and Procedures Association of America, 1959, p. 103-117.

[3]Figure 2 is an adaption of a form used to assess clerical manpower requirements as explained by Joseph W. Lucas **et al,** in **More Profit — Less Paper: Through Work Simplification,** as summarized in **"Setting Standards for Clerical Performance," The Management Review,** October 1953, p. 588.

[4]Rogert Boguslaw and Warren Pelton, **"STEPS — A Management Game for Programming Supervisors,"** Datamation, November / December, 1959, p. 13.

similar to **Figure 3** for subsequent comparison to actual effort expended.

Record and Compare Performance

Having established the standard values upon which to measure programming effort, and having created a budget of programming effort required, the analyst is now in a position to have actual programming effort recorded and compared against the established standards. The actual recording of programming effort is accomplished by having each programmer keep a time sheet and measure the time taken and the volume of units of measurement that he consumes on each function of program development. It is in the best interests of the programmer himself that he retain an accurate record of such productive time expended, for, if he has a tendency to crib on non-productive time then his ratio of non-productive to productive time will be out of relation to that experienced by other programmers. Therefore, there is an incentive for the programmer to utilize as much time as possible in productive effort and to keep his non-productive effort at a minimum. The supervisor is thereby released from the annoying task of keeping programmers busy. In other words, the programmer is responsible for his own supervision in the utilization of productive time.

From the time sheets at the end of every month a recapitulation is made of the work effort expended by each programmer and is compared to the predicted programmers requirements on the form illustrated in **Figure 3.** The statistics thus gathered are compared against the standards which have been set for each job. The percentage efficiency with which each worker has performed his task may then be calculated. Similarly, a percentage efficiency may be obtained for the entire staff of programmers.

At the same time, a double check is made on the effectiveness of supervision. The comparison of actual work effort consumed as against what was predicted gives management a yardstick by which they may assess the supervisor's ability in determining workload requirements.

The progress of application development may also be determined in relation to the forecasted schedule. Programmers requirements and conversion schedules may then be revised in light of discrepancies pointed out by this comparison. Such

SYSTEMS AND PROGRAMMING
PROJECTED PROGRAMMING EFFORT REQUIREMENTS

Application:_____ Month:_____

Function	Unit of Measurement	Units Possible per month	Program Units Required	Manpower %	Program Units Required	Manpower %	Program Units Required	Manpower %	Total Program Manpower Reqts
		(a)	(b)	(c)	(b)	(c)	(b)	(c)	(d)
Logic Development									
Develop English narrative	blocks								
English logic review	hours								
Develop file content	fields								
Sub Total %									
Programming									
Develop machine logic	blocks								
Code instructions	instructions								
Prepare file format layouts	files								
Manuals preparation	hours								
Programming assistance	hours								
Instructional assistance	hours								
Prepare output formats	hours								
Sub Total %									
Debugging									
Pre assembly preparation	hours								
Desk checking	hours								
Prepare test data cards	cards								
Prepare program control cards	cards								
Program debugging	hours								
Sub Total %									
Programmers required (%)									
Non measured functions (%)									
Total Programme effort (%)									
Total programmers required (manpower)									

Figure 2

INSTRUCTIONS FOR COMPLETING FIGURE 2

1. Column (a) is to be filled in with the total number of units of each function that would be possible of attaining in one month. This may be calculated by dividing the total productive time in one month by the standard time value established for each unit of measurement.

2. Column (b) will indicate the predicted number of units of each function that will be consumed on each program during the month concerned. This may range from zero up to the maximum possible as indicated in column (a).

3. Column (c) is the result of: $\frac{\text{Col (a)}}{\text{Col (b)}} \times 100$

to give a percentage of manpower required for each function.

4. Column (d) summarizes the percentage manpower requirements for all programs by function.

5. Column (c) sub totals are totalled to give the total manpower or programmer effort required in percent for all functions within a program and column (d) gives the same for all programs. Note that this chart measures only the productive work effort required, therefore an allowance must be given for non-productive and non-measured functions.

6. The last line converts the percentage manpower requirements into actual programmers required. e.g. 15.39% means that 16 programmers are required.

Application———— Program————

SYSTEMS AND PROGRAMMING
REVIEW OF EXPENDED PROGRAMMING EFFORT

Month————

Function	Allowed Man Hours	Actual Man Hours	Allowed Cost	Actual Cost	Variance	
					Man Hours	Cost
Logic Development						
Develop English narrative						
English logic review						
Develop file content						
Programming						
Develop machine logic						
Code instructions						
Prepare file format layouts						
Manuals preparation						
Programming assistance						
Instructional assistance						
Prepare output formats						
Debugging						
Pre assembly preparation						
Desk checking						
Prepare test data cards						
Prepare program control cards						
Program debugging						

Figure 3

schedule revisions will thereby be made on a realistic basis rather than by hunches and guesses.

Benefits of Measuring Programmers Effectiveness

The benefits of realistic work measurement may be disseminated to all levels of an organization. Management personnel have a method of assessing the capability of an electronic data processing installation in processing anticipated workloads. Workloads may then be scheduled so as to develop even production without the inconveniences of peak loads and idle times. They may recognize peak load requirements and offset these by shifting personnel or by hiring additional temporary assistance. Management is thus able to budget programming staff requirements much as they are able to budget the costs of the more easily forecasted factors of production requirements.

The supervisor benefits by having a system whereby he may assess the proficiency of one individual against another. He is able to evaluate the productivity of each programmer and to establish the total productivity of his office. He is better able to schedule expected workloads and to recommend corrective action in catering to peak loads. He is given a method whereby he may budget the programming costs of his production unit. Additionally, a base is provided upon which to recommend rewards in the manner of pay increases or promotions.

By having a method to assess programmers capability, assignment of programmers may be made more realistically by relating the degree of complexity of the program to the capability established for each programmer. Such a realistic assignment of programmers to work they are capable of handling is facilitated by the breaking down of the program into its basic functional units, and assessing the total requirement through building up on the basis of each functional unit.

The programming staff will gain in the knowledge that they can accomplish a fair day's work with a minimum amount of disturbance or inconvenience. By having their work scheduled in a reasonable manner, the programmers are relieved from the worries of work pressure and overtime. By having enough work to keep them busy at a reasonable rate throughout the day, the time will appear to slip by much quicker. Having been assigned specific jobs and having had these jobs enumerated in detail for them, they will experience less supervisory interference in the performance of their jobs. Additionally, they will take more pride and interest in their work since they will have more incentive in attaining a high utilization of their time.

The organization as a whole benefits through reduced operating costs and increased performance in the processing of management decision-making data.

Dreyfack on PERSONNEL —A Monthly Feature

Are Your "Bad Pennies" Really Bad?

RAYMOND DREYFACK

FEW THINGS ARE MORE REWARDING to a manager than the knowledge that through his efforts and understanding he has taken an ill producing malcontent and converted him into a useful employee. By the same token, nothing is more exasperating than having to abide the sub-standard performance of the chronic ne'er-do-well.

This is one of the large problems of management today. Unfortunately, at interview time, despite all the scientific evaluation tools available, you can't always bounce a *"bad penny"* on the table and detect that it rings false. Sub-normal producers do manage, like small persistent bugs, to make their way through the screen.

Even more unhappily, not always are the non-producers non-productive from the outset. Often—more often than some managers would care to admit—potentially good producers become non-productive as a direct result of the foibles of mismanagement.

A Case History

The big question then is, *"Why?"*; the big objective is Operation Probe. Shirley, will you please hand me that file, the one labeled, *"CHARLEY JONES"?*

Let's open the folder. Charley Jones, This Is Your Life. Age, 28; married, 2 children. Occupation, tab operator. Date of hire, 3 years ago.

Let's read a little further. IQ tests, above average; personnel screening test, the same. Record? Good for his first year on the job; after that, rotten.

Why does a man's performance start out good and then turn sour? Obviously, Charley, with his wife and two kids, has as much at stake as the company. He'll go no place fast with this kind of record.

Sure, the case is not unique. There are thousands of Charleys destined to go no place fast. How many are hopeless, however, and how many may be *"saved"* is a different question.

Charley, in his present situation, is a headache to himself and his employer both. The odds on bet is that he's not a happy employee either. Let's try to learn why. If we can it may help Charley and the company both.

Employee Research

Step one then is Operation Probe. What makes Charley tick? We already know his intelligence is above average. His poor performance isn't due to stupidity. So let's take our detective work from here.

Let's wildly assume for purposes of speed and convenience that we have on the premises a giant Insight-O-Matic machine with all of Charley's characteristics stored in its prodigious memory, his attitudes and feelings, his desires and fears. In place of interview techniques, testing and observation, all we have to do is query our monster, and presto, the complexity of Charley's behavior becomes clear to us.

Query number one, then. What is Charley's attitude? *"Bitter,"* is the prompt reply. Why? Here the machine smokes a little before answering. *"Supervision."*

To cut a long program short, we learn Charley can't stomach the supervisor directly in charge of him. He feels he's being taken advantage of, that operators less capable and experienced than himself are being given preferred treatment. His immediate superior is unfair, domineering and sarcastic.

Here's your problem, Mr. Manager, with regard to Charley. Is there some truth to his contentions, or is he just feeling sorry for himself? If there's any justification at all in his attitude it's obvious why his performance could decline.

Let's leave Charley now, and reluctantly, our Insight-O-Matic. The query response spewed forth on our monitor printer is only one possibility in explanation of poor performance. There are innumerable others.

Maybe your *"bad penny"* requires challenge and responsibility on the job, and instead is being confronted day after day by monotony and routine. Maybe he's afraid of new concepts and involved changes of procedure. Maybe he just isn't cut out to be a leader, but might make an excellent follower.

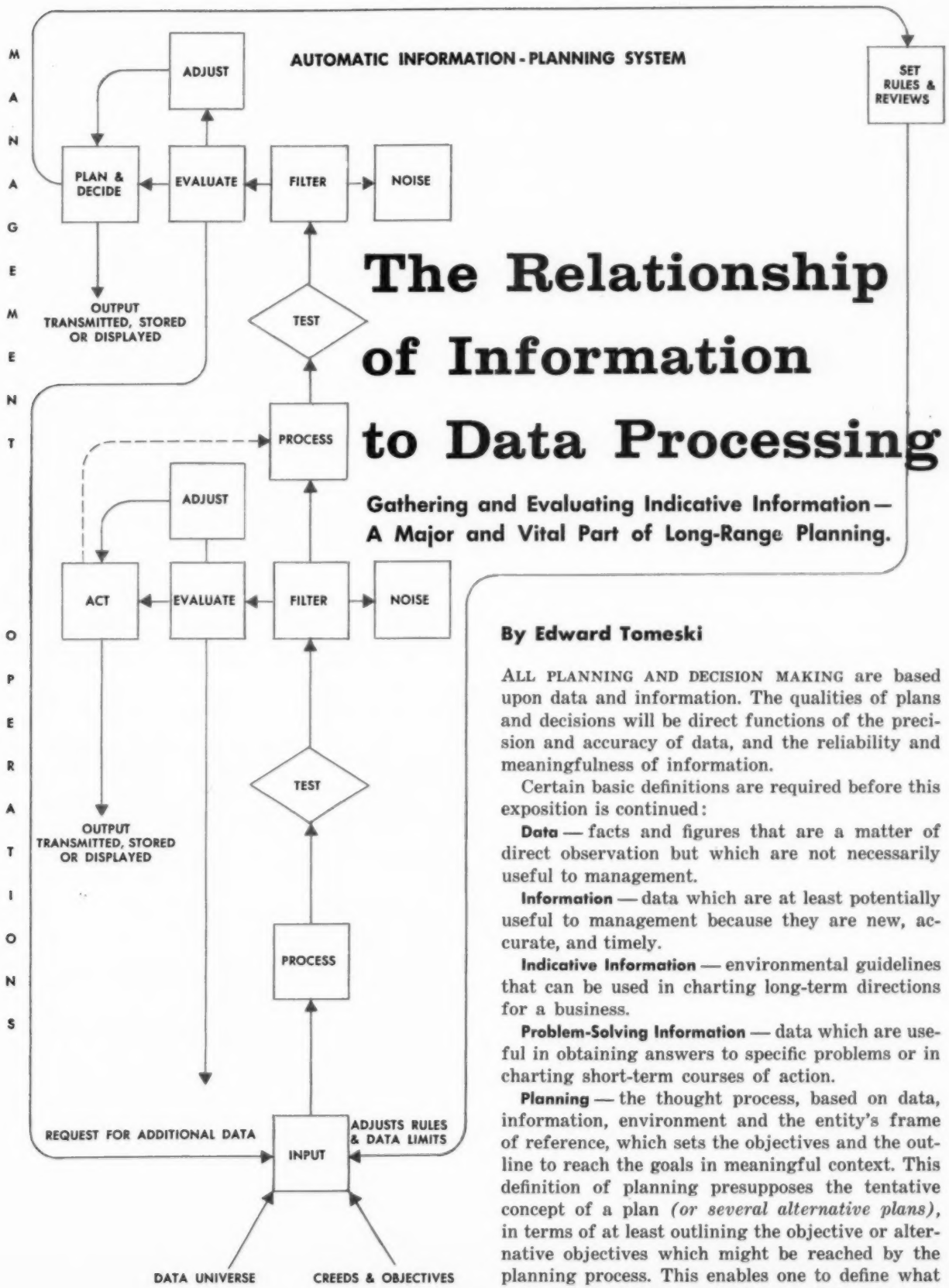
Maybe he just isn't getting enough bolstering from management and supervision. Most of us need this to some extent. A pat on the back where merited may do wonders for a person's ego *and* performance.

Maybe his aptitudes just don't fit his assignments. Possibly he yearns for independence of operation. It's a funny thing. Some people hate being shifted from miscellaneous assignment to miscellaneous assignment. Give them one volume job they can sink their teeth into and they're happy.

All we're doing now is scratching the surface, of course. What grievances, real or imagined, are your *"bad pennies"* harboring against the company, management, supervision, the guy at the next work station?

It always reverts back to the word, *why*. It's a management obligation—both human and economical—to search the matter through. To interview, question and observe. Operation Probe.

You must make every possible effort to get to the bottom of the problems of the Charleys under your jurisdiction. To *"save"* them where possible, and failing this, to let them go. ■



The Relationship of Information to Data Processing

Gathering and Evaluating Indicative Information — A Major and Vital Part of Long-Range Planning.

By Edward Tomeski

ALL PLANNING AND DECISION MAKING are based upon data and information. The qualities of plans and decisions will be direct functions of the precision and accuracy of data, and the reliability and meaningfulness of information.

Certain basic definitions are required before this exposition is continued:

Data — facts and figures that are a matter of direct observation but which are not necessarily useful to management.

Information — data which are at least potentially useful to management because they are new, accurate, and timely.

Indicative Information — environmental guidelines that can be used in charting long-term directions for a business.

Problem-Solving Information — data which are useful in obtaining answers to specific problems or in charting short-term courses of action.

Planning — the thought process, based on data, information, environment and the entity's frame of reference, which sets the objectives and the outline to reach the goals in meaningful context. This definition of planning presupposes the tentative concept of a plan *(or several alternative plans)*, in terms of at least outlining the objective or alternative objectives which might be reached by the planning process. This enables one to define what sort of information probably should be gathered

in order that the planning process may be carried on intelligently.

Hypothesis

Students of business have been keenly aware of the necessity to measure, by appropriate managerial economic tools, the cost and value of goods. This is necessary for the constant awareness of the state of the organization, both historically and as of a given moment, and to plan and budget for the future.

However, little or no attempt has been made to scientifically measure the cost and value of another important factor of the enterprise — information. Decisions as to the need or expendability of information are often made with only cursory evaluation. Today, executives are often buried under the reports and memoranda spewed forth from electronic speed devices and self-justifying subordinates and superiors. The avalanche of information, as indicated by the significant labor movement from production to white-collar jobs, gives every indication of accelerating. There is a need to develop a corporate *information theory* which will permit management to place a value on information, just as it can place a value on an hour of labor or a piece of equipment. Only by developing such a yardstick will the needed operating efficiencies, so long effective in the factory, become a reality. Only limited attempts have been made to place a value on information, that is, equating its cost against its contribution to the firm's objectives.

One of the significant factors in today's American economy, the production of information, is virtually immune to the measurement controls that management correctly recognizes as indispensable in the manufacturing processes.

Information Analysis

An important, but too little used, tool of information analysis, is the *exception principle*. The exception principle is to report to management only items that vary significantly from planned results. The information system evaluates the data, compares to a standard, and decides if the variation is worth calling to management's attention. If not, it is filtered out of the system, or automatic-type exception plans can be implemented.

The exception principle requires that a *normal range* be developed for each set of information. If the information falls inside the range, a single plan of action can be carried out. When information falls outside the acceptable range, various alternative plans can be implemented — depending upon the *variation* from the norm. With the advance of computers there has been much talk about, if not implementation of, *automatic decision making*. This means that data processing equipment is programmed to take appropriate automatic action, just as the automatic factory manufactures engine blocks without the direct assistance of a human hand.

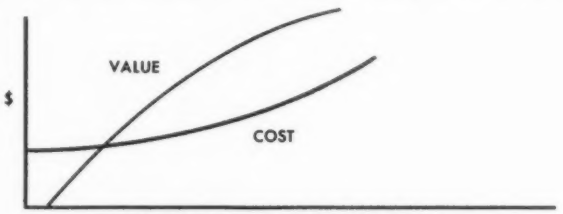
In an ideal automatic decision making system, management's main task would be to review decisions and to set up and adjust the criteria for objectives, policies, and the decision rules. The creation of decision rules, which must be stored in the data processing equipment, for various alternatives is essential for automatic decision making. Needless to relate, automatic devices are more efficient than human beings in applying rules to reach decisions. Further, the programmed rules can be prepared by a few talented individuals and applied, by machines, in areas that formerly could not command the time and abilities of specialists.

The Value of Information

All information, whether indicative or problem-solving, must have a cost and a value. Theoretically, both the cost and value can be measured. The *value of information* is best measured in terms of its relationship to operating performance or to revenue. To determine which information is needed and which is not, there should be some sort of dynamic corporate value theory. Such an information value theory might be built around criteria such as:

a. Precision.
b. Impact.
c. Determinability.
d. Pertinence and/or Importance.
e. Timeliness.

For instance, let *precision* be defined as the difference between the answer obtained and the true answer, or in other words, the *margin of error*.



The more precise the information desired, the most cost involved. Conversely, the more precise the information desired, the more value the information normally has. Of course, the most useful margin of precision for information depends on the user and the situation. However, the information model should determine at what point additional accuracy becomes too costly for the margin of value it contributes. This would normally be at the point of greatest difference between value and cost.

Impact of knowing or not knowing certain information is often overlooked, and yet it is a vital

factor in any evaluation of information. An executive who is exposed to too much irrelevant information will probably neglect his higher missions. The effect on the enterprise of an executive knowing or not knowing about a set of information should be considered when attempting to measure its value. A useful guideline for measuring the importance of information are the benefits achieved over a period of time.

When *determinability* is great, information becomes somewhat superfluous. Frequent and important changes increase the value and impact of information on planning. Certainly determinability should be a factor in any theory of information valuation.

Information must flow to the proper person, in the proper quantity, in meaningful form, if it is to be *pertinent*. Important information in the hands of someone without authority to make a necessary decision is useless and may well have negative value.

The age or *timeliness* of information is a crucial element in evaluating information. As information ages, it becomes less valuable for management planning and decision making. Minimum age should be an objective in an ultimate-type information flow system. This implies a real cost involved in information delays. Another controllable time factor is the reporting interval, which along with delay, can be combined in determining an optimum information age. The common time unit, e.g., monthly reports, may not necessarily be the optimum.

Structured Guideline Needed

Only by having some sort of structured measuring guideline, as indicated above, can top management objectively distinguish between valuable information and marginal information. If too much irrelevant data creep into the input of top management, confusion, inefficiency, and poor performance result. A properly functioning information system will cull out data at different corporate levels, permitting only the highest value information to come before top management.

It would seem that some academic rules, as outlined above, are necessary before one can objectively determine the kind of information needed in the planning process. If such rules are not set, and if feedback is not used to measure the appropriateness of the information input, the enterprise can squander resources gathering and processing low value data and information. Moreover, the planning executive will probably either make decisions on incomplete, distorted, irrelevant, or minimal information.

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Finally, the *dynamic aspects of information* cannot be dismissed. For instance, technological trends are rapidly emerging as one of the most vital segments of indicative information. The need to more objectively determine the information inputs to the managerial planning process becomes increasingly vital as the volume of data multiplies. This presages a corporate unit which might be entitled *"Detached Thinking,"* where uncluttered and truly independent study could proceed to most profitably connect the enterprise with those parts from the cycles of information that are most meaningful.

Looking into the Future

Projecting trends revealed by indicative information can be said to result in predictions or forecasts for corporate long-range planning purposes. Today, a prediction or forecast expressed in terms of a reasonable range or spread is adequate for most purposes.

The need for more accurate and longer-range estimates will increase the need for more scientific-type approaches to the gathering and use of information.

Management information systems can be explained as being formed by predetermined data requirements that, by a combination of logic and reasoning, create **(1)** the types and volume of data that must be gathered; **(2)** the types of analysis used on the data; and **(3)** the way in which the data will be further processed and transmitted to designated personnel or stations. The functions and relative positions of the recipients of information interdependently determine and are affected by the scope, detail, and timing of the information furnished them.

Changes that are now in process in information technology, as represented by *information handling and transportation,* will accelerate information gathering, processing, and reporting. The next great advances in the field of automatic data processing will probably be those of *information storage and retrieval,* virtual *instantaneous relaying of information,* and *management decision making.* This implies better and more information available, and displacement of marginal management personnel. Because of the probable capital required for such electronic devices, the marginal and less adaptable enterprises may well have difficulty in surviving, unless they band together, against the probable greatly increased effectiveness of the industry leaders.

With the advance of management science, the corporation of tomorrow will have a model for *information valuation* which will be able to, with the assistance of electronic devices, masticate vast bits of data. Information — historical, current, and forecasted — will be automatically manipulated and filtered out at the proper organizational layer at the proper time, based upon preset corporate rules set by the entity's objectives. A national, if not international, information storage depot of all data that has existed in the history of man will be available to the businessman of tomorrow. Each major enterprise's *electronic information center* will be linked to the national information storage depot, from which bountiful and meaningful data will be available in seconds. It will still be the individual corporation's challenge to select and use the virtually unlimited sets of information in profitable fashion. Each unit of the corporate entity will be linked by virtually instantaneous wireless communication that will eliminate delays and erroneous transmission of data. The transmission systems will feed input directly into closed loop, self-correcting, self-learning electronic machines that will automatically process, select, and direct the flow of information throughout the organization structure, as master programmed by the enterprise's *data processing executives.* The automatic office will become as much a reality as the programmed factory is becoming today. ■

This paper was originally presented before the College of Planning, The Institute of Management Sciences, January 1960.

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RAY MARIEN

–A Monthly Feature **Marien on FORMS**

Much Ado About Something

THE MARCH COLUMN, entitled "The Bigger They Come — The Better We Like It!" has aroused a minor uproar among one segment of the business forms field, namely, the "dealer."

First, allow me to define the word "dealer." It means someone who sells printing but who generally has no equipment of his own. He represents many large, capable printers, but cannot properly be called a "printer" himself. In many cases he is referred to as a "printing broker." In fact, the name "dealer" seems to be used only by these individuals themselves although it certainly seems to be a more fitting term to describe their occupation.

The gist of their comments on the March column has to do with a simple premise — "The 'Big Ones' may be good, but so are *we*!" Here is a typical letter, this one from D. C. Kerrigan, President of Southern Systems & Forms. We quote in part:

"The casual reader, however, in the field of Data Processing, could not help but derive the impression from this article that all big companies in the forms business are trustworthy and all small companies are otherwise. Again I say that I feel sure that this is not the impression that Mr. Marien intended but that none the less the impression would almost certainly be gained by many readers . . .

"There are hundreds of business forms salesmen around the country, who are either in business for themselves or who are representing smaller companies in this field. Many of us are career-type people who take a great deal of pride in our work and feel that we are every bit as competent as the very large companies, in many cases, as a matter of fact, surpassing these large companies in the area of quality, flexibility, delivery, price, knowledge, 'technibility,' and customer service."

Another quotation, this one from Don Barr, of Don Barr Associates:

"When you get several quotes there is frequently substantial difference in the prices, even on identical specifications. Think then of the advantage and extra value a Buyer gets who is the customer of a capable, conscientious Dealer who has the available production of many reputable Manufacturers — who knows just what types and specifications each Manufacturer can produce most economically . . .

"Finally, the forms salesman for a Manufacturer who was most successful, solvent and confident is most often the one with the courage to embark on his own as a Dealer. No one gives more conscientious effort to his customers and business than the man who is in business for himself."

Both of these gentlemen make their point well. They are proud of their profession. Many of the biggest concerns in the country buy business forms from dealers or "brokers." Yet, a surprisingly large number of them may not realize it. Only those with astute printing buyers are well aware that the "printer" to whom they give the order has no equipment of his own.

Why is it that some buyers are not cognizant of this simple fact? We believe that the fault lies on both sides of the fence. Some buyers absolutely refuse to do business with "brokers" who have no equipment, and some dealers, realizing this, attempt to pass themselves off as full-scale printers with one or more plants. We feel that the situation generally is an unfortunate one.

A top-flight broker, with a large volume of orders, can virtually control equipment, as he's welcomed by many a printer anxious for his business. As to making a job good — *he has to* or he goes out of business. That's simple enough. And seeing that his overhead is nil, a broker is actually in a pretty good position, when you get right down to it. In fact, many big printers have lost sizable orders to brokers whose only overhead consists of a neat wardrobe and a membership card in the Diner's Club.

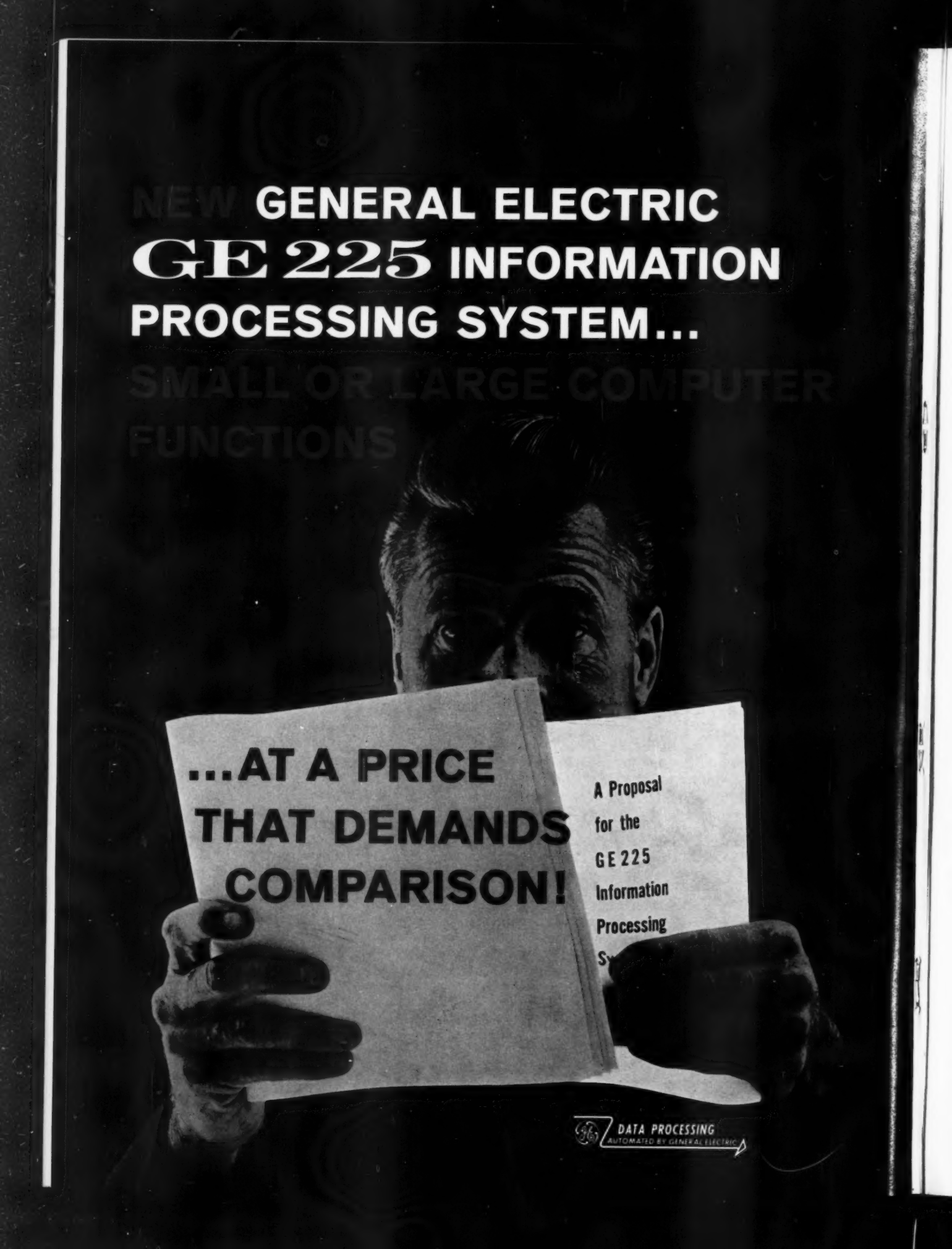
The term "broker" should not be reprehensible to anyone. An honorable printing broker is a good man with whom to do business. He can be of immeasurable help to a buyer. The situation would be resolved quickly if printing brokerage were accepted as the honorable profession it is, and not treated by some as a back-alley business. But this condition will never prevail unless and until both the broker *and* the buyer recognize the truth and act accordingly.

The broker who resorts to subterfuge and misrepresentation, or outright pretense at being something other than he truly is, is doing himself, his profession, and his customer a disservice.

The printing buyer who treats all brokers as if they were creatures who had just crawled out from underneath some slimy rock is equally at fault. He, as much as anyone, virtually forces the broker "underground," and makes him camouflage himself as a printer, or adopt the chameleon—cloak of "all things to all men."

Certainly, the buyer is not always acting without cause. There *are* unscrupulous brokers in the business, but they are in the minority. Remember, there are also a handful of renegade printing buyers who discredit their profession, but no one condemns *all* buyers because of the actions of those few.

Both parties must be aware of the true situation and must have mutual trust and regard for each other. Only in this way can the printing "dealer" gain the universal respect he deserves. ■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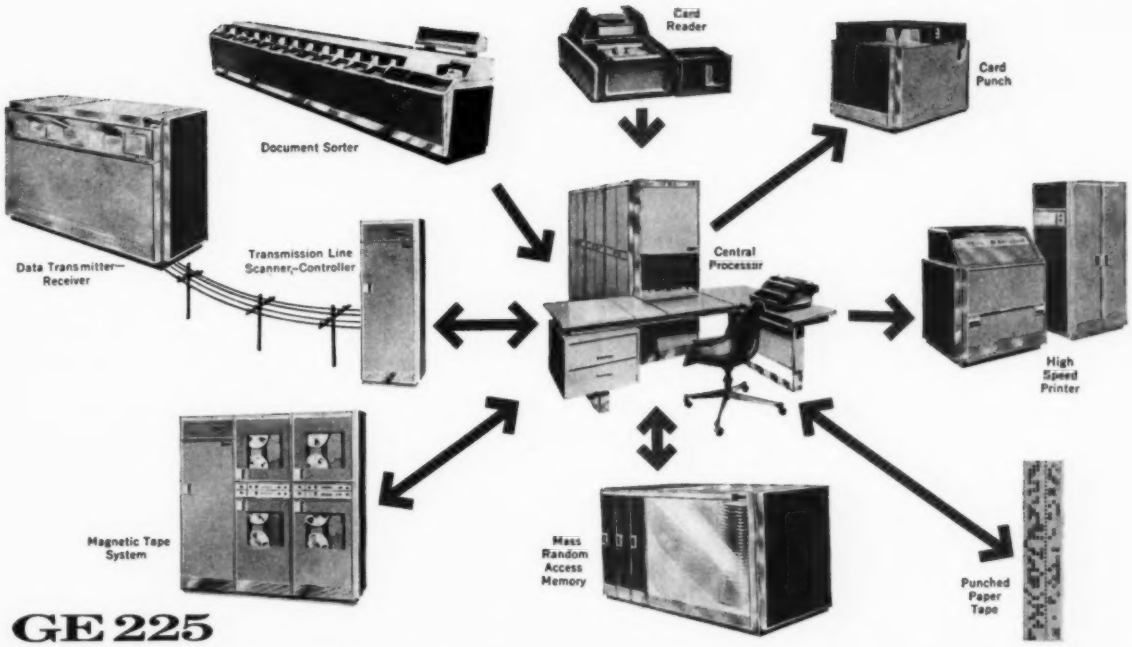

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Medium-Scale Computers

JOSEPH R. DE PARIS

TODAY'S MEDIUM-SCALE COMPUTER offers a hardware package designed to melt the resistance of even the most critical assayer of electronic data processing equipment. The solid-state componentry promises greater reliability of performance; the magnetic core internal memory so enhances processing speeds that *"milliseconds"* per operation become *"microseconds"* per operation; input-output speeds are accelerated in harmony with the new faster processing speeds. The concept of building-block design enables the user to start small and to increment or decrement according to his needs.

Card and/or tape-oriented configurations are available for virtually every situation. The whole system can be programmed using the automatic programming packages provided. Put it all together and you have a tool so powerful that few managements can resist its appeal!

The medium-scale offerings of today are so advanced technologically and are so in consonance with practical, everyday business requirements, that they have preempted the favored position held so long by IBM's 650. Up to a very short time ago the 650 absolutely dominated its class; today it would be an unusual situation in which the 650 would be favored over systems like IBM's 1401 or RCA's 301. This is especially true where a computer system is being acquired for the first time. Here, there is no existing investment in programming that would have to be liquidated. Present users of 650 have to give serious consideration to the cost of reprogramming existing jobs.

IBM's 1401 and RCA's 301 typify the modern day medium-scale computer. Right from the days of their much-heralded announcement they have evoked considerable enthusiasm among systems and data processing people. In the March issue, this column reviewed the 1401; accordingly, let's take a look now at the RCA 301 system.

RCA 301 Features

RCA's 301 system is a general-purpose data processing system designed to fulfill the varied requirements of the user with *"modest"* volume. RCA recognizes that the data processing problems of the medium-sized organization vary from the larger organization only in volume, not in complexity or in variety. Hence, the 301 has built-in capability to cope with problems from business applications to the solution of complex mathematical formulas.

The 301 features a wide range of input-output devices coupled with two sizes of magnetic core memory. Apparently any combination of units is available that suits the needs of the user. The 301, like the 1401, does not utilize control panels anywhere in the system. All devices are operated on-line under control of the stored program.

Input-output devices include a paper tape reader and a paper tape punch, both operating at the rate of 100 characters per second. The printer prints at a rate up to 600 lines per minute, the card reader is rated at up to 600 cards per minute, and the card punch at 100 cards per minute. Up to 12 magnetic tape stations and up to five record files are available to complete the input-output possibilities.

A basic card-oriented configuration, consisting of a 10,000 character memory, a card reader, a card punch, and the printer, rents at approximately $3555 per month. The addition of 10,000 more positions of core memory, six tape stations, and the simultaneous mode device brings the rental to about $6640 per month, about the cheapest tape system you can get. One record file, providing 4.5 million characters of bulk storage adds roughly $425 to the monthly bill.

The rental for a 1401 card system, consisting of a processing unit, read-punch, and printer, is about $2600 per month but the core storage capacity is only 4,000 characters. However, the rated speed of the reader is 800 cards per minute and of the punch 250 cards per minute.

Core Storage

The 20,000 positions of core memory available with the 301 give it the largest high speed memory in its class. The 1401 is available now with 16,000 positions. What is the real utility of the core storage capacities of these computers? Both systems operate on variable length data so that no storage is wasted for leading zeroes in fixed length words. However, the 1401 uses a variable length instruction format of from one to eight characters per instruction whereas the 301 uses a fixed length instruction of ten characters. Since the core memory must accommodate both the instructions and the data being processed, the real utility of the available positions resides in an analysis of the number and length of instructions in the program.

The RCA 301, unlike the IBM 1401, is buffered between the processing unit and each of the input-output units. The buffers are one-character cores which serially transfer data to or from memory positions. Buffering normally means that a degree of time-sharing can be attained by parallel operation of components in operations such as read and print, read and punch, read and print and punch. In the 301 it appears that the buffering really avails you very little in the standard machine but when the simultaneous mode device is added to the system, a significant reduction in overall

processing time may be realized with no change in programming. This device includes a duplicate set of control registers which provide the ability to perform combinations of input-output-compute simultaneously.

The 1401 has an optional buffer for the printer called the print storage device. This device, although it brings about an important increase in printing output, does not afford the increase that the simultaneous mode device gives the 301. In addition, it must be realized that the simultaneous mode device can have the effect of shrinking the difference in speed between the read and punch units of the two systems.

Unique Record Files

Finally, a word about the unique record files available with the 301. These files are inexpensive bulk storage mediums with a capacity of about 4.5 million characters per file. They undoubtedly will stimulate many systems possibilities for their use as time goes on. At the present time one possibility is to put programs on the disks, releasing the tape station often used to hold the program. Another is to place all service routines on the disks as well as the COBOL assembler. Further, the disks might be used for temporary storage of data which could then be punched or printed at a later time, thus releasing a tape station or core storage.

Although the record files are essentially random access devices and can be used for random access applications such as inventory control, this is not one of the record file's strong points. The average time to read or write a block of data is 4.25 seconds, with a minimum of approximately 2 seconds and a maximum of approximately 8 seconds. In most random access situations, there is enough frequency of demand for data in storage that this kind of time could be ill-afforded. However, it is conceivable that the record file could be used for a situation in which there was a large inventory with a very low activity rate.

Well, there you have it! Look back in the June issue to see our other comments on these systems. The RCA 301 system has much to recommend it. It is an important addition to our data processing capability. The prospective user of a 1401 is a prospect for a 301. You must study both systems *(and probably others as well)*, if you are going to intelligently determine the one best suited to your needs.

Happy Hunting! ■

Notable Quotes

"The punched card is by no means a recent development and has, in fact, been used extensively in tabulating for more than half a century. Developed in 1889 with the purpose of speeding up the recording of census information, the punched card originally actuated a mechanical machine which would transcribe the information punched in the card and record it on a visual register. Almost immediately electricity was applied to this first machine and the electric tabulating machine was born." Gilbert W. Kerr, *"The Function of Automation," Bests Insurance News,* October, 1959.

"There's a revolution going on in the American business office . . . Old jobs are disappearing; new ones taking their place. The white-collar worker of today is a different being from his predecessor of as little as a decade ago. Everything about him is changing — the work he does, the way he does it, the rate of pay he receives.

"This revolution is going on so quietly, so gradually, that its full impact is clear only when you contrast the present pattern of office work with that of an earlier period.

"In nearly every job classification studied, the trend has been in the direction of increased specialization and increased mechanization of white-collar work." *"Today's Silent Office Revolution," Dun's Review and Modern Industry,* April, 1960.

"To the extent that top management can secure more facts more quickly about how things are working out, to that extent can they take corrective action more assuredly, more quickly, both as to time chronology and time consumption. Thereby can they lessen their preoccupation with the affairs of the present and focus their attention on the possibilities of the future.

"Since automation permits a more versatile, more flexible and more vital business enterprise, the traditional methods for justifying the purchase of equipment based on what the equipment will save are inadequate in evaluating purchase of automation equipment." Dickey Dyer, *"Creative Thinking," Instruments & Control Systems,* May, 1960.

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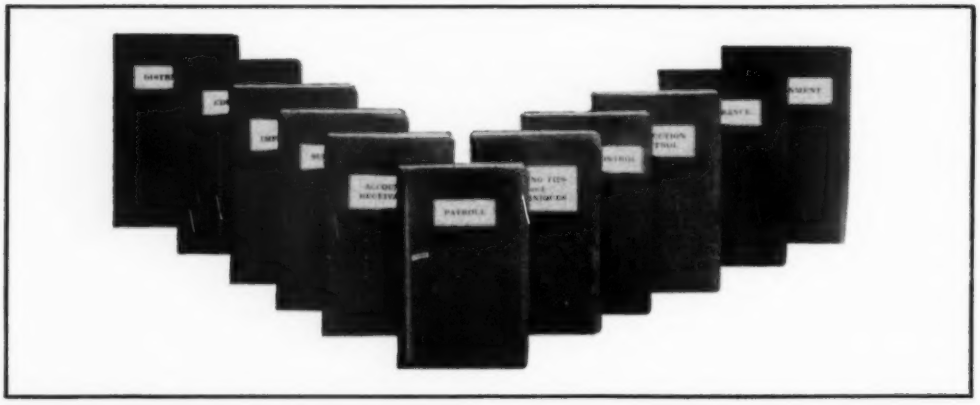

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APPLICATION OF THE MONTH

By W. T. Jones, Jr.

Inventory Control at Knitting Mills

Use of a Computer Promises to Save Hundred Thousand Dollars a Year.

AT QUEEN KNITTING MILLS, Philadelphia, manufacturers of sportswear, an estimated five million garments a year are produced, filling about 12,000 individual categories, each defined by style, color, and size. About 200 orders are received per day with 3,000 line items — style and number of pieces per size, per color — specified.

In June, 1959, we installed a Bendix G-15 computer, MTA-2 tape unit, PR-2 high speed tape reader, and a TPT-1 paper tape punch, with supporting equipment consisting of adding machines coupled to Systematics inter-couplers and paper tape punches, and a Remington-Rand Synchro-Tape.

Daily information is provided on order per style, size and color, number of garments being cut, garments being finished and garments on hand. The system does a job which would require 15 manual operators, and does it at half the cost. The inventory control program has three parts.

Part I

At the beginning of each season *(fall, cruise, spring, summer, and transitional)* a master dictionary is prepared on all styles and colors for that season, by a dictionary routine. The master dictionary permits the use of any four-digit style number in random sequence. This becomes an integral part of the program's first part. The program is stored on punched paper tape and read into the computer each day.

Daily input data is identified as orders, cancellations, returns, seconds, cuttings in work, cuttings, adjustments or error correction adjustments. This information is in paper tape, put there through the adding machines and tape punches.

The first entry onto the tape is an automatic digit, designating the function, followed by the style number and the color code. The adding machine motor bar is depressed after each size entry, automatically identifying the size. At the end of the size range the motor bar is again depressed and due-dates, special orders, salesmen codes and miscellaneous information may be entered. An automatic check to make certain the correct style and color code have been entered is made by keyboard re-entry of the codes. They are then subtracted from the initial entry and any discrepancy is printed out. In case of error a buzzer sounds until a void key depression eliminates the entry. The operator must follow the proper punching sequence or the adding machine locks up. No further data can be punched until a new style and color code have been specified or the void key depressed.

The inter-coupler punches the tape in the computer format, entering tabs and stop-codes at the same time the information is entered on the adding machine. After 26 line operations a stop-code is automatically punched in the tape. This block of information fills one storage line in the computer memory, and is separated by the stop codes for efficient processing. *(continued on next page)*

FORM # 1

CUTTING AND ORDER ANALYSIS REPORT

PAGE NO. 7 DATE 5 10

STYLE NO.	COLOR CODE		TOTAL ALL SIZES	34	36 S	38 M	40 L	42 XL	44	46
				8	10	12	14	16	18	20
0477	10	TOTAL SALES	5776	216	626	1005	1235	1130	900	664
		TOTAL CUTTING ORDERS	6998	328	810	1180	1423	1357	1084	816
		OVER OR SHORT	1240	113	241	246	174	175	185	106
		CUTTINGS IN WORK	7016	928	867	1251	1409	1285	785	779

Instructions for the first phase are stored on the memory drum of the computer. The tapes on the day's transactions may be read by the tape reader as they are prepared *(this reads at 400 characters per second)*. As it reads, the data enters the computer and a search operation is done whereby the codes regarding the storage address of a specific style and color classification are added to the line item. This data is then stored in the magnetic tape unit.

The day's transactions, properly coded, can be accumulated in the tape unit.

Part II

An up-dated punched paper tape on inventory-order status is maintained daily. At day's end, the previous day's updated tape is read into the computer along with the instructions for carrying out the second phase.

Phase two reads in the data stored on the magnetic tape unit, compares it with the day's previous totals and performs the necessary arithmetic operations to update. It is then processed through the tape punch for a new punched paper tape *(the punch operates at 60 characters a second, on-line)*. This data is ready for preparation of reports on a daily or weekly basis, via the next phase.

Part III

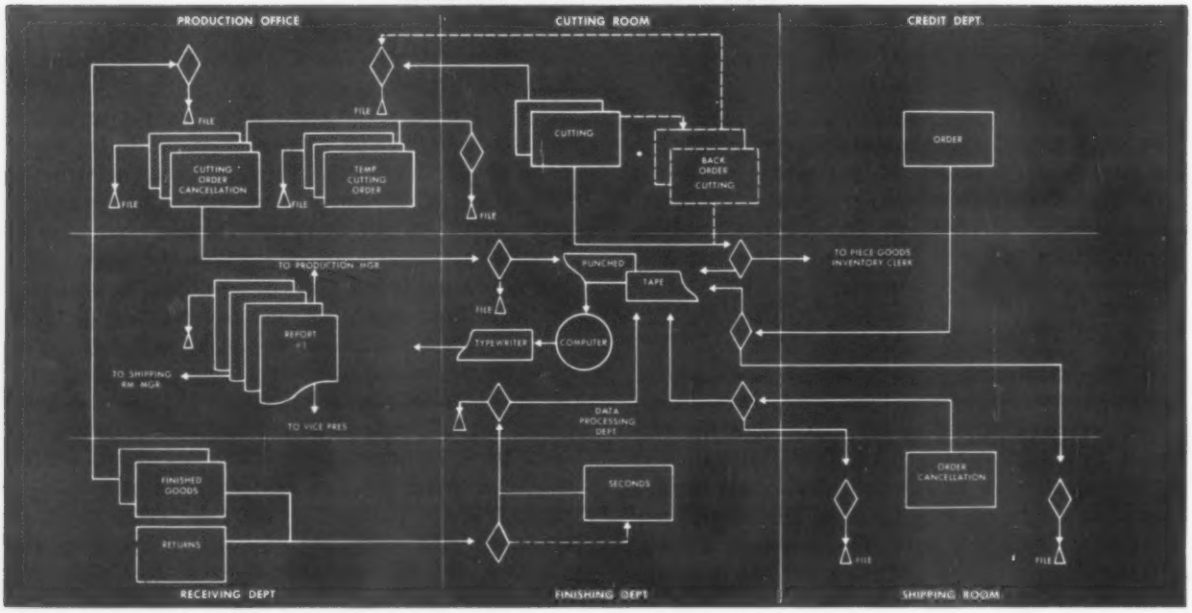
Updated tape is read into the computer, with computer instructions, to edit for printing according to preplanned format, page number, date, spacing, tabs, and carriage return. A new tape is punched out and read into the synchro-tape which prepares multiple printed copies on special forms. Particular parts of the information may be extracted from daily or weekly records for special reports.

The complete report, showing status of each style by color and sizes, is a guide to inventory control, purchase of material, production scheduling, and sales promotion. At the end of the season an analysis of orders by salesmen and territories is made. Future extension of the program will be to maintain a perpetual inventory on magnetic tape.

The G-15 is particularly economical for our inventory control work in that data can be processed without waste machine time. Input and output operations proceed simultaneously with computations, permitting a continuous flow of activity within the system. The machine performs about 1850 additions a second.

This is the first step in a progressive program which will be in effect for at least two years. We have plans to develop routines for outstanding order position, shipping dates, order velocity, and sales promotional programs by style, color and size as well as piece goods inventory. These programs will be controlled on a *"management by exception"* principle.

INVENTORY CONTROL FLOW CHART



The Unit Record–Core of Data Processing

Balance in data processing as one manufacturer sees it.

By McLain B. Smith

FROM MILLISECOND TO MICROSECOND TO MILLIMICROSECOND — a phenomenal speed record established by computers during the past ten years. Little wonder that in the world of business and science the 1950's are often referred to as *"The Computer Decade."*

In 1950 we were working with switching relays which operated at thousandths of a second. Today, our fastest commercial computers are recalling information from storage in about two microseconds. And, in advanced areas, we are experimenting with materials that switch in some twenty millimicroseconds.

The history behind these great advances in computer capabilities goes back some seventy years. In that time we have graduated from statistical machines to accounting machines and now to data processing systems. The last ten years of this period have been quite topheavy in technological advances.

But significantly, these advances have not been limited to the world of computers. It is true there are more than 2,000 commercial computer systems in use today which embody sophisticated methods unheard of until comparatively recently. But at the same time there are also some 30,000 punched card systems in operation.

What we have then is a situation where for every manager of a computing installation, there are at least fifteen data processing *(punched card)* managers who are vitally interested in what the future holds for them in terms of equipment which will fit their operating and financial requirements.

Improvements in the 1950's

Of what significance has the past decade been to the users of *"conventional"* machines? To what extent will they share in the new concepts which represent the latest trends in electronic data processing? What thinking has been aimed directly at unit records?

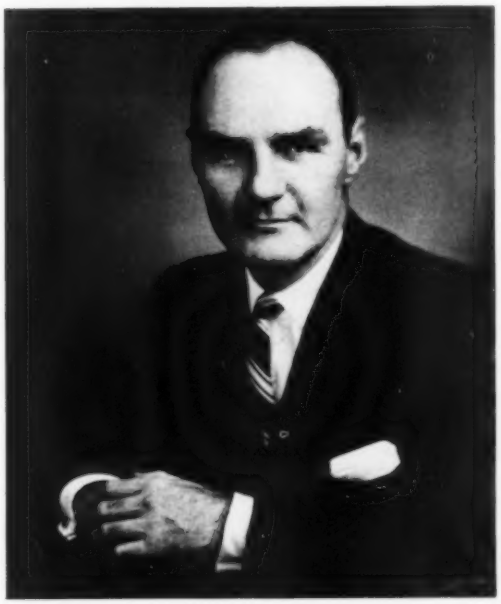
The answers to these questions can probably best be found in three areas represented by actual hardware: **1.** New types of punched card machines which can improve existing installations from within; **2.** A new line of punched card machines specifically designed to bring office mechanization within dollar reach of any but the smallest organization; and **3.** New products incorporating advanced features originally associated only with large systems.

We have talked about computer speeds. Now let us look at what has happened to some of the basic punched card machines during the past ten years.

We can start with the most basic machine — the card punch. Improvements have been made here which have simplified the duplicating of punched information on a repetitive basis and greatly facilitated error correction. Thus the cost of recording has been reduced by increasing the efficiency of the production step.

Looking at sorters, machine speeds have increased from 650 cards per minute to 2,000 cards per minute. Likewise, collator speeds have increased in range from 240-480 cpm to 650-1,300 cpm.

Similar advances are evident in accounting machines which have gone from 100 lines per minute to 150 lines per minute. If we take into considera-



tion the 1403 Printer, we can show printing speeds up to 600 lines per minute.

Obviously, these advances fall into the category of improving existing installations. There are others, but one in particular bears closer investigation.

IBM's RAMAC 305 *(Random Access Method of Accounting and Control)* was designed as a rapid means of locating and processing specific records without searching through large volumes of information. RAMAC in-line processing is advantageous even when there is comparatively low data activity in a large file of information. For example, normal activity of an inventory file utilizes an average of only *five per cent* of the total number of stocked items in any given day. In addition, it is estimated that *eighty per cent* of all inventory transactions make use of only *twenty per cent* of the inventory's items. Random access to this information eliminates needless, time-consuming searching of records not needed in any given transaction.

This is but one addition to the punched card field in the past ten years. And though the RAMAC 305 is comparatively new, further developments within that short period have increased the system's flexibility and productivity.

In its proper perspective, machine speed is the equivalent of capacity, rather than an end in itself. If we reduce volume of output and rate of production, while maintaining the ability to perform all basic functions, the result can be expressed as a low-cost line of equipment for the smaller user.

We are talking now about advances which have put punched card systems within the realm of all but the smallest organization. This is, in essence, the formula behind the IBM Series 50 punched card machines.

The six Series 50 machines introduced are reengineered versions of the 82 sorter, 77 collator, 514 reproducer, 602A calculator, and 402 accounting machine. Except for slower speeds, they are equal in scope to their standard counterparts. A growing company, moreover, can expand from Series 50 to the next larger punched card line with no conversion problems. For example, any user of a 50-402 accounting machine can have it field-converted into a standard machine in a matter of hours to meet increased requirements. Some customers are even using Series 50 equipment side by side with standard data processing machines.

With prices, as well as card handling speeds, scaled down accordingly, a basic Series 50 installation consisting of a sorter, accounting machine and standard card punch can rent for as little as $270 per month. The cost of additional units would be proportionately higher, but still within the reach of many an organization which would otherwise be barred from adopting mechanized methods. These are businesses which have most of the accounting problems of larger companies, but until now, no means of entry into the data processing picture.

In this age of decentralization, moreover, it is not only the smaller business which can benefit from a low-cost punched card line. There are also large-company branch operations which are a no man's land of partial mechanization. Now, these offices can be economically equipped with punched card systems to make reports from the field machine-readable by headquarter's installations.

Communications

By the same token, the punched card as a true unit record becomes even more efficient when communications links can be established between point-of-origin and point-of-processing. Data collection and data transmission are two of the most vital areas to which we can look for further developments.

To illustrate the general need for automated data collection, we can cite the example of a major manufacturing company. The management made a survey of its procedures for hand-carrying reports from the production line to the machine room for processing. It was found that an average of two per cent of the paper was somehow lost or mislaid in transit. What this figure means in terms of meeting order completion dates needs no further comment!

The IBM 357 Data Collection System is designed to close gaps of this nature through automatic card-to-card reproduction from reporting station to a central control point. Up to 20 input stations can be linked to a single output unit up to one cable-mile distant. This means that job progress through the plant, or any activity involving men, machines or material, can be logged direct from the source in unit record form.

On another plane, there are new products incorporating advanced features originally associated only with large systems.

Chief among these is the 1401 Data Processing System. For smaller businesses previously limited to the use of conventional punched card equipment, it provides high-speed card punching and reading, magnetic tape input and output, high-speed printing, stored program and arithmetic and logical ability.

Here is a system designed not only for independent use, but as an adjunct to larger systems. This alone demonstrates that so-called *"large machine"* technology is no longer exclusively within the province of the large user.

Configurations of the 1401 include a card system, tape system, and a combination card/tape system. In addition, it performs functions previously requiring a number of separate machines: card reading and punching, separation of output cards, cal-

culating and printing.

Of considerable importance to the smaller business is the fact that the 1401 incorporates the building block principle, providing for expansion and a variety of configurations to fit the needs of the user. A basic 1401 card system can be rented for $2,475 per month.

New simplified programming techniques make the system extremely powerful and more efficient. Variable length data and program instruction words provide maximum utilization of the magnetic core storage; there is no waste of storage capacity as with fixed-record length systems. Program steps may be skipped or reread in any desired sequence, a feature which greatly increases programming flexibility. The program is entered via the card reader of the card read punch by means of special program cards.

In payroll, for example, the 1401 can prepare registers, check and earning statements and deduction registers at speeds up to 600 lines per minute. The system will accumulate regular and overtime hours and gross earning for each employee, check each employee's accumulated total hours and dollars, and print a daily performance record. A new development in printing and line skipping allows the computer to produce over 230 two-line documents per minute — equivalent to a combined printing and skipping speed of 4,800 lines per minute.

So far we have talked of the past and the present with regard to punched card systems.

The Future

Since its inception, the unit record *(the punched card)* has proven its versatility in every facet of our economy. It is handling every conceivable type of business and administrative problem, and its potential seems inexhaustible. Machines of ever-increasing efficiency and capacity are literally built around it. While the users of these latest machines and the techniques they embody are taking advantage of their present potential, we, of course, will continue to explore their future potential which will write a significant part of the data processing story during the coming decade. ■

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Circle No. 12 on Reader Service Card.

New Equipment

IBM 7074 SYSTEM

International Business Machines Corporation announced the advanced solid-state IBM 7074 data processing system. The new computer is twice as fast processing business data and is up to twenty times as fast in scientific computation as the IBM 7070 system to which it is related. Typical 7074 systems will sell or rent for about twenty-two per cent more than 7070 system prices.

Any IBM 7070 can be converted to a 7074 system in the customer's office. The major change is the replacement of the three 7070 modules with two high-speed 7074 components.

The *"building block"* design of the 7074 lends itself to growth to match user needs. The capabilities of the 7070 and 7074 now range from those of a medium-scale system to those well within the range of large-scale systems. Both systems offer five models of the processing unit; four models of core storage; and six models of core storage control units.

Additionally, the 7074 can process any work planned for the 7070 system. According to Y. P. Dawkins, director of marketing, data processing division, *"No time need be lost for conversion or rewriting the 7070 programs — the detailed instructions that tell a computer what to do with the data fed into it. Thus, 7070 programs, which comprise the most comprehensive set of programming systems ever developed by a manufacturer in support of a data processing system, can be put on 7074 equipment directly."*

Volume delivery of 7070 systems is now underway. The first customer system was delivered to Texas Instruments Incorporated, Dallas, on June 13, 1960. More than fifty 7070s will be installed in customer offices in the United States by the end of this year and over two hundred by the end of 1961.

A typical 7074 system will sell for $1,284,350 and will rent for $29-300 a month. Comparable prices for the 7070 system are $1,077,400 and $24,000.

7074 Details

Like the 7070 data processing systems, the 7074 offers card-only, tape oriented, or card/tape/RAMAC systems in several combinations. Features of both systems include automatic priority processing; automatic simultaneous read, write and compute; scatter read or write in tape operations; and comprehensive, fully compatible program library.

The high-speed processor gives internal processing speeds six times faster than those of the 7070. The 7074's high-speed core storage reduces access time to a ten-digit word to four microseconds, as compared with six microseconds in the 7070. As in the 7070, core storage in the 7074 is available in two sizes, 5,000 or 9,990 words.

Full parallel arithmetic together with the optional high-speed floating decimal arithmetic make the 7074 a powerful scientific system in the intermediate price range. For example, the 7074 can perform a floating point addition in sixteen microseconds, compared with 212 microseconds by the 7070 system.

PROCESSING SPEEDS

Fixed Point	7074	7070
	(operations per second)	
Addition/subtraction (six digits)	100,000	16,667
Multiplication (ten digits x five digits)	23,250	1,635
Division (five digit quotient)	14,280	571
Logical decisions	250,000	27,700
Floating Point		
Addition/subtraction	62,500	4,068
Multiplication	16,667	970
Division	10,400	389

Access Time	7074	7070
Core Storage	Four microseconds	Six microseconds
Disk Storage	Both systems—105 to 850 milliseconds	

Data Transmission Rates	(operations per second)	
Core to disk—disk to core	Both systems — 12,000 digits	
Core to core	1,250,00 digits	416,000 digits

Circle No. 30 on Reader Service Card.

NEW LOW-COST MACHINES

The first transistorized punched card calculator to be offered at a rental of less than $1,000 a month was announced by the Data Processing Division of International Business Machines Corporation.

Known as the IBM 609 B-1, the machine rents for $735 to $1,089 per month, and sells for $36,000 to $50,-390. The introduction of the 609 B-1 follows by less than two months the announcement of its more powerful counterpart, the IBM 609.

Designed to meet the needs of smaller users, the 609 B-1 has the same high processing and input-output speeds as the 609, but a smaller memory and fewer program steps.

Additions to Series 50

Also announced were additions to IBM's Series 50 equipment, low-cost versions of standard punched card machines. These include a new member of the Series 50 line, the 403 accounting machine, and new models of the 402 accounting machine.

The new models of the Series 50 402 bring to twelve the number now available. They vary in printing and tabulating speed and in the number of accumulating counters and type bars.

The Series 50 403 will also be available in the same twelve models as the 402. The various models of the two machines give users a choice of speeds and capacities to suit their individual needs.

Now available for the first time as an optional attachment to Series 50 equipment is the IBM 916 bill feed. The bill feed provides greater flexibility in mechanizing many business applications.

402 Accounting Machine

The 402 prepares printed reports from alphabetic and numerical information punched in cards. Complete flexibility is provided in the arrangement of the printed data

through the use of a wired control panel. The machine adds, subtracts and totals automatically.

To meet the volume requirements of different users, the various models of the 402 have printing/tabulating speeds ranging from 50/50 to 50/100 per minute. Variations in the number of accumulating counters and type bars to meet specific job requirements are also provided.

403 Accounting Machine

The 403 is similar to the 402 in all respects except that it can print three lines from a single card; the 402 can print only one line. The twelve models of the 403 are identical to the twelve models of the 402 in printing and tabulating speed, and in accumulating counter and type bar variation.

916 Bill Feed

The 916 bill feed is an optional attachment to Series 50 machines which provides greater speed and economy for many typical small business applications. It makes possible the automatic preparation of card documents such as utility bills, payroll checks, subscription renewals and licenses.

Circle No. 31 on Reader Service Card.

609 B-1 Calculator

This calculator is identical to its larger counterpart, the 609, in size, speed and general applications. It differs in storage capacity and in the number of program steps incorporated.

Programmed by a single wire control panel, the 609 B-1 is equipped with sixteen program steps. Additional steps may be ordered in increments of sixteen up to a maximum of sixty-four.

The 609 has eighty program steps which can be increased in increments of sixteen to a maximum of 144. It is programmed with two wired control panels.

The 609 B-1 makes available eighty-four positions of magnetic core storage, which can be increased in increments of three words to a maximum of 192 positions. The larger machine makes available 240 positions which can be increased in increments of three words to 384.

Both 609's can perform calculations at microsecond speeds, and card reading and punching is at a basic rate of 200 cards per minute. Contained in a compact unit only five feet long, the 609 requires no special power lines nor air conditioning.

Circle No. 32 on Reader Service Card.

AUTO-CONTROL SYSTEM

A new Auto-Control System for the Philco-2000 electronic data processing system provides an automatic interrupt feature and increases the efficiency of the computer.

The interrupt feature of the Auto-Control System is completely under program control and permits the programmer to determine the system conditions that shall be checked, when these conditions shall be checked, and the action to be taken when these conditions are present. In addition to increasing the powers of the programmer the Auto-Control System makes the most efficient use of program time by automatically monitoring computer operations. The new system also increases the scope

(continued on next page)

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Circle No. 11 on Reader Service Card.

of the entire Philco 2000 computing system by the expansion of real-time capabilities, and by the interlacing of several problems on a programmed priority basis.

Controls Computing System

The design of the Auto-Control System is provided to give the programmer maximum control over the computing system; all conditions to be checked are indicated by one register. Each bit in this register is designated to represent the presence of a certain condition, and when that condition is present, the bit is set to one. The priority given to these conditions is up to the discretion of the user. The bits that cause the program to be interrupted are determined by a mask which is designated by the programmer. If a condition, which sets one of the bits in the register, is detected, and if that bit is covered by the mask, the program is interrupted. A transfer is then made to an executive routine which jumps to a separate subroutine for each condition. These subroutines are prepared by the programmer and permit him to program what actions he feels are necessary for any specified condition. The inclusion of a register with variable priority, a programmed-controlled mask and flexible subroutines gives the programmer control of the entire computing system.

The system allows more efficient use of program time by indicating, to the program, the status of any specified operation. In a system that does not have such a control, program time must be taken up with instructions which check the availability of input-output units, the presence of transmission errors, or the completion of any lengthy computer operation. With the control the program is automatically notified of the status of any desired computer operation, and the need for extensive monitoring instructions is eliminated. Thus programs which require the monitoring of computer operations are made more efficient.

The incorporation of an automatic control increases the capabilities of the entire system by expanding the real-time uses of the system and by permitting the interlacing of probelm runs. Real-time devices connected to the computer through an Auto-Control System can be arranged to interrupt a program only when an input is available. Thus the only computer time that is used by the real-time device is the time required to either write a word into memory or to read a word out of memory. In addition, a number of real-time devices can be connected to the computer through the Auto-Control System, and the inputs from these devices may be programmed and then run on the computer on a priority basis determined through the control.

Circle No. 33 on Reader Service Card.

GE MEDIUM COMPUTER

The General Electric Company's Computer Department actively entered the medium-priced, general-purpose computer market with announcement of a new all-transistorized information processing system.

The new machine, designated GE-225, is aimed to serve a broad market, ranging from scientific applications to complex business data processing. Lacy W. Goostree, Jr., Department manager of marketing, said introduction of the GE-225 marks General Electric's first bid for the general-purpose market.

Incorporating a newly-developed *"general-compiler"* programming technique, the computer automatically translates English words and symbols into machine language. Thus, the computer can be programmed by personnel with little or no training in language of modern computers.

The new computer combines features of many large machines. They include unique circuitry, core memory, high-speed computation, low-power requirements, and ability to handle a large variety and quantity of peripheral devices.

These features, Mr. Goostree explained, give the GE-225 a lower cost per computation than any computer in its class; up to one-third less. In addition, the new computer can add 25,000, five-digit numbers per second, about 10 times faster than medium-priced computers now available.

The new computer is priced in the $125,000 to $400,000 range — leas-

Project engineer John Fields checks one of the more than 400 logic plug-in boards in a new GE-225 general-purpose computer at the General Electric Company's Computer Department in Phoenix. The logic boards are used in mathematical computations, data transfer and temporary storage. Some 3,000 transistors are used in the computer.

ing from $4,000 to $12,000 monthly — depending on peripheral equipment.

The new computer is the fourth all-transistorized data-processor introduced by General Electric's three-and-a-half-year-old Computer Department. Others include the ERMA system developed for Bank of America, the first commercial all-transistorized machine; the 304, designed to specifications of National Cash Register Company; and the GE-210, developed to serve general requirements of banking, credit-accounting, and utility billing for bookkeeping, and reporting through use of magnetic ink character recognition *(MICR)*.

Several orders have been placed by banks throughout the country for the GE-210, incorporating MICR. Bank of America is currently handling more than 500,000 documents daily with MICR, the only such system thus far in commercial operation. First National Bank of Arizona will begin processing branch accounts by MICR before the end of the month.

General Electric's Computer Department also markets four transistorized industrial computers for such process industries as petroleum, chemical, steel, cement, utilities and others.

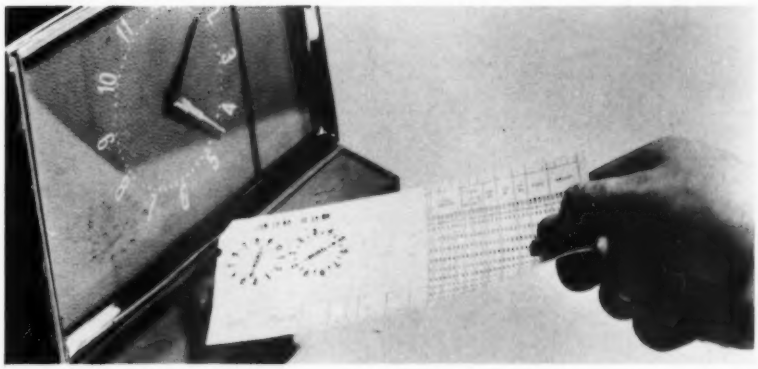
The new computer can simultaneously handle eight different types of peripheral devices, such as magnetic and punched paper tapes, controllers, MICR, high-speed printers, card readers, and mass storage memories. Installation problems are minimized because of low-power requirements. Transistorized design reduces cooling needs.

Special input-output devices can be used with the new computer for measuring and controlling temperature, pressure and speed. Thus, the computer can also be linked with an industrial process.

Circle No. 34 on Reader Service Card.

ELAPSED TIME COMPUTER

Data collection and processing systems that provide industrial cost control specialists with fast, accurate information for job and labor costs are the common and accepted methods of modern business management and operation. Virtually all input to data processing is automated except the largest single cost factor—labor time and machine time.



A new, automatic elapsed time computer designed and engineered by the Calculagraph Company, Harrison, N. J. provides industry with an answer to this problem. Used either for single item computation or as an integral component of any planned or existing cost control systems, the Calculagraph elapsed time computer automatically computes and simultaneously prints elapsed time, the difference between *"start time"* and *"finish time"* of a given operation. Programmed by the user to deduct automatically non-working intervals such as overnight idle time or lunch periods, the Calculagraph prints only actual time worked.

What Is Elapsed Time

A variety of cost information can be determined by elapsed time. Among the most frequent uses of elapsed time are the preparation of such data as labor cost *(direct and indirect)*, production time, piece rates, maintenance time, departmental time and machine utilization time. For example, it provides a record of the hours per job of any order going through a plant, leading eventually to cost evaluation. Elapsed time records also permit costing of each basic production operation; time per individual machine is instantly available. Finally, one of the prime uses for elapsed time computation is labor distribution, or payroll records.

For example, if a job starts at 8:20 a. m. and finishes at 3:25 p. m. on the same day, total elapsed time is instantly available upon completion of the job. The Calculagraph would record 6 hours and 20 minutes actually spent on the job, deducting 45 minutes spent for a lunch period. Accurate productive elapsed time is immediately available because the Calculagraph automatically follows a program set-in by the individual user to deduct idle time, such as lunch hours, coffee breaks, etc., from actual working time.

Basic Principles Of Operation

A unique feature of the instrument is the program device, fabricated from a polypropylene plastic material. Shaped like a 2-inch pipe, the program device is perforated to allow a large number of electronical pins to be inserted into it. These pins can be installed by the user to establish a predetermined program. Programmed to any minute of the day, the Calculagraph will provide timing impulses for bell ringing or other control purposes.

Another feature of the new Calculagraph is the automatic trip device which eliminates any manual effort on the part of the user in recording elapsed time and assures positive alignment of the job card. When most any standard size and shape punched or job cards are inserted into the instrument, the date and exact starting time are automatically recorded on the card. At the finish of a given operation or at the end of a shift the card is again inserted and the elapsed time or actual working time is printed in hours and tenths, or in hours and minutes. In addition, the construction of the Calculagraph makes it possible to obtain from four to six legible carbon copies on an individual punch operation.

Circle No. 35 on Reader Service Card.

PRODUCTS & SERVICES

MULTI-WEB DECOLLATORS

The latest addition to the Moore Business Forms line of decollators is the Moore Multi-Web Decollator, Model No. 8210. It is claimed to handle large volume, high speed deleaving with a minimum of trouble. Illustrated is a 6-web. The basic machine is a 4-web and modular units of two parts may be snapped into place for 6 and 8 part decollators.

All machines can be converted in the field if the user desires. Moore is now accepting orders and anticipate from 60-90 days for delivery.

Circle No. 40 on Reader Service Card.

LOW-COST ELECTRONIC BOOKKEEPING

A Chicago area company revealed it is making electronic data processing available to the small businessman — from the small manufacturer to the butcher, baker and corner grocer — beginning at just $10 a month.

This development in electronic data processing usually regarded as costing thousands of dollars a month has been announced by Charles A. Bail, president of A.S.C. Tabulating Corporation, a data processing center headquartered in suburban Lake Bluff.

Bail said the breakthrough came when A.S.C. Tabulating succeeded in programming a low-cost Bendix G-15 electronic digital computer to process large volumes of data at high speeds via punched paper tape input.

The recent advent of punched tape accounting, he explained, opened the door first for business machine processing of data for small businessmen, eliminating the need to post records manually and do mathematical calculations.

"We, however, have gone one step beyond existing methods. Instead of transferring current information from tape to punched cards as required by business machines, we feed the tape directly to the computer," Bail said.

"This means we can handle more data faster. The individual, therefore, gets the benefits of large-volume processing on low-cost electronic equipment."

Circle No. 41 on Reader Service Card.

SPEEDREADER 2000

The Uptime Corporation Speedreader 2000 is a high-speed card reading machine which in normal operation reads punched cards at a rate of over 2000 cards per minute. Cards are placed in the hopper at the top of the machine. When the machine is turned on, it picks these cards off the stack one at a time and transports them past a row of photo diode sensors. A light shining through the holes in the card energizes the photo diodes. Eighty photo diodes are placed across the width of the card, one for each column. A vertical column of timing photo diodes are used to activate the reading photo diodes at the correct time. After the last row has been read on each card, an additional timing diode is used to check the electronic circuitry. The cards which have been read are stacked in a removable tray for easy removal from the reader. A number of interlocks prevent the machine from being turned on when it is not ready to read cards. The machine will also turn itself off in the event of a card jam or other malfunction.

Circle No. 42 on Reader Service Card.

COMPUTER FLOORING

A new raised flooring system providing an unobstructed level surface under which power service systems for modern computers can be concealed has been introduced by Haskelite Manufacturing Division of Evans Products Company

The lightweight, portable flooring, now being produced at Grand Rapids, Michigan, provides maximum flexibility in planning computer room layouts for either new or existing construction.

The new flooring system eliminates the need for expensive permanent duct work, piping, and cables necessary to connect the power computer units.

Basis of the new Haskelite Free-Access floor is a combination of rigid structural panels which rest in steel platform cradles supported at each end by adjustable legs or jacks. The platforms can be adjusted to heights from 10 to 12½ inches to provide more or less housing space for the maze of computer service systems and also assure proper floor leveling.

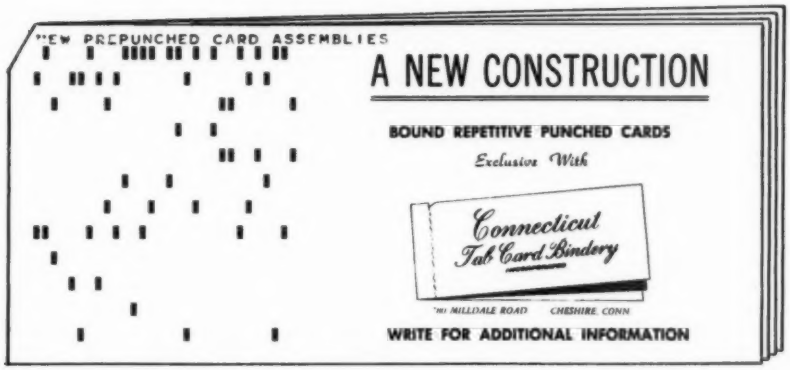
Individual panels will support a uniformly distributed load of 200 pounds per square foot or a concentrated load of 1,000 pounds at any one point according to Haskelite engineers. Cutouts in individual panels permit entry of wiring, cord and cables through the raised floor for connection to machinery.

Individual or combinations of panels are easily removed with a suction device for fast rearrangement, removal, or to service parts of the computer cable system. The one-inch-thick lightweight panels resist vibration, fire, and moisture, and provide a flat, smooth surface which deadens sound.

Circle No. 43 on Reader Service Card.

PUNCHED CARDS BOUND

Data processing cards, either punched or purchased with repetitive punching, can now be bound.



Even if they are glued with other parts they will tear apart leaving no glue traces.

A new bindery construction allows pre-punched and/or repetitive punched cards to be bound with other cards, or paper copies, to give the constant factor. This is a service offered by the Connecticut Tab Card Bindery, Inc.

Circle No. 44 on Reader Service Card.

PHILCO 2000

Philco Corporation's Computer Division has shipped five Philco 2000 electronic data processing systems to date this year, reports James M. Skinner, Jr., president. In addition, 16 more are in production at the new facility in Willow Grove, Pa. which was opened early this year.

The 2000 was the first large scale system in the computer industry to use an all-transistor design. The system is suited for both business and scientific applications.

The Computer Division is currently completing its national sales organization and the 15-state regional office for the midwest will be opened this summer in Chicago. Other offices are in Palo Alto, Calif., New York City, Boston, Pittsburgh, Willow Grove, Los Angeles, and Washington, D. C.

Circle No. 45 on Reader Service Card.

UNIVAC III

Industrial, financial and automotive executives were briefed on the Remington Rand Univac III during a two day seminar at the Park Shelton Hotel in Detroit in mid-July.

The Univac III is a solid-state computer with a processing speed nine times as fast as the Univac II. The improvements in III stem from the work done on LARC, a large scale solid-state scientific computer recently delivered by Remington Rand to the Atomic Energy Commission.

The new system has a program interrupt feature that automatically tells the computer when its peripheral equipment has completed a task, so it can be put to work again. Reading, writing and computing can be carried on simultaneously; read/write speed is 200,000 digits a second. Magnetic core memory is available in units of 8192 words expandable to 32,768 words.

The card reader operates at 700 cards a minute, and output from the printer is at the rate of 700 lines a minute. The system will rent from $15-30 thousand a month, depending on system requirements.

Circle No. 46 on Reader Service Card.

NEW SCRIPTOMATIC ATTACHMENTS

Two new attachments have been introduced to extend the range of the Scriptomatic Model 10 Addressing Machine. An automatic bulk feeder at one end and a conveyor-stacker at the other end permit handling of a wide range of envelopes, folders and other material for completely automatic addressing. No tools are required for either attachment and the machine may be changed from hand feed to bulk feed and back in less than a minute.

These new attachments, together with optional electronic sensing *(Model 10-S)* combine to make a practically universal addressing unit for large or small list users. The electronic sensing attachment *"reads"* the notched edges of the master cards and prints or skips according to program *(66 combinations possible)*. It also counts each category and delivers masters in file sequence.

The Scriptomatic Addressing Machine prints from typewritten card masters which are prepared with chemical transfer by ordinary electric typewriter. Data to be reproduced is retained in a highly refined, long lasting deposit on the reverse side of the card when it is typed. Data is transferred to envelopes, folders, etc., running through the Scriptomatic machine at high speeds. The Scriptomatic method can also dovetail with IBM, Remington Rand or any punched card system. In these, the punched cards become address masters; there is no need for separate lists, or address stencils.

Circle No. 47 on Reader Service Card.

CODE PUNCHED TAPE TO CARD CONVERTER

A Universal Code Punched Tape to Card Converter, the Model C750, has been announced by Systematics, a division of General Transistor Corporation. Using the C750, any 5, 6, 7 or 8 channel punched tape can now be used as input to punched card data processing systems.

The converter is engineered for attachment to any IBM Model 024 or 026 card punch. Addition of the Systematics C750 enables the card punch to automatically translate punched tape data to punched card data. Normal, manual operation of the card punch is not impaired by attachment of the tape to card converter—the same card punch can be used for regular keypunching.

Circle No. 48 on Reader Service Card.

PORTABLE LABORATORY TAPE RECORDER

A new portable magnetic tape recorder has been announced by Ampex Data Products Company, manufacturers of recorders for scientific, industrial, business and military use. The CP-100, a complete 7 or 14-channel recording and reproducing system is a reel-to-reel machine for instrumentation or general laboratory application.

The CP-100 can be operated in its mobile case or mounted in a standard 19-inch equipment rack. It accommodates either ½ or 1-inch-wide tape on 10 ½-inch reels, and provides six tape speeds, 1⅞, 3¾, 7½, 15, 30 and 60 inches per second as well as fast-forward and rewind. Direct or FM-Carrier recording is employed. Built for use at altitudes up to 10,000 feet, the CP-100 operates while in motion, in airplanes, surface ships, trailers, submarines, and other mobile applications. Its case is 1 x 2 x 3 feet; weight is 160 pounds.

Circle No. 49 on Reader Service Card.

GOLD STAR FILES

The Wright Line, Inc. announced the new Gold Star File Line, a complete economy line of files. The three-quarter suspension files are available in 20, 12 and 4 drawer models and the full suspension is available in 20 drawer model only.

The sturdy, lightweight drawer is interchangeable with any other Gold Star File. The drawers are also self-stacking with large handles and full card labelling. The narrow case saves floor space. Heavy strengthening girder construction and all welded rigid construction holds front true and square to give easier opening and closing and gives long life.

The 20 drawer full suspension file offers touch-release opening and new Glide-Wright suspension to give smooth opening and closing of heavy cradles.

Circle No. 50 on Reader Service Card.

FRIDEN DUAL TELEDATA

Latest in the series of new tape-operated communications equipment to be developed by Friden, Inc. is the Friden Dual Teledata Model 8C, an 8-channel code transmitter-receiver, which provides for the transmission of a single, continuous tape at double the speed of a similar standard model Teledata. This is accomplished by transmitting alternately over two transmission channels, each operating at the normal speed of 75 bits per second.

All features of the standard Teledata are retained, including a double parity checking arrangement providing a high degree of assurance that received codes punched in tape are identical to the transmitted tape codes.

The Dual Teledata is housed in a console-type cabinet containing all the equipment required for transmitting and receiving punched tape, including a single reader-punch chassis and two transmitter-receiver chassis. Space is also provided in the lower portion of the cabinet for mounting channel deriving equipment when the Dual Teledata is to be connected directly to a voice circuit.

The Dual Teledata transmitter-receiver has been designed for operation in either half- or full-duplex systems. In a half-duplex system it is possible to transmit 850 characters per minute in either direction, but not both directions simultaneously. Full-duplex indicates that information may be transmitted in both directions at the same time. This allows for 850 characters in both directions, or a total of 1700 characters per minute.

A double parity check system is built into the Dual Teledata to detect errors caused by bits or transients encountered on transmission circuits.

The Dual Teledata reads 8-channel tape containing any type 7 bit, self-checking codes in 7 channels, with provision for reproducing the 8th bit when used with carriage return or end-line code. Depending on the telephone facility, it is possible to utilize four Teledatas on the same circuit.

Circle No. 51 on Reader Service Card.

CONTROL PANELS

Virginia Panel Corporation is manufacturing new self-contacting control panels. Covers may be put on or taken off without removal of cover screw fasteners. Plastic-light VPC control panel covers according to the manufacturer are more durable than sheet metal and will not corrode, bend, dent or conduct electricity. Additional VPC panel advantages claimed by the manufacturer are unmatched clarity of characters,

aluminum frame and contoured handle lightness, and 24 hour shipping service.

Circle No. 52 on Reader Service Card.

VISIBLE PUNCHED CARD

A bottleneck in data processing systems, the file clerk, has been attacked by a new visible card, MAGNE-TAB. The card has an exclusive patented feature which permits faster finding and filing of cards, up to 60% faster in some operations, according to the manufacturer, Business Efficiency Aids, Inc.

The cards have a permanent built-in magnetic action which causes the cards to repel each other at the touch of a finger. Twenty or more cards fan-out automatically in the file trays at any point of reference, exposing the top edges of all twenty cards instantly, with sufficient space between each for quick, easy removal.

The fatigue that accompanies monotonous card-handling functions caused an understandable decline in work output and an unavoidable increase in filing errors. By minimizing this fatigue factor, MAGNE-TAB claims to increase accuracy as well as speed and significantly reduce clerical turnover in tedious card filing jobs. Clerks can locate cards visually instead of relying on fingertip dexterity. This eliminates tedious manual *"thumbing"* and *"finger-fumbling"* to separate and locate cards. ■

Circle No. 53 on Reader Service Card.

Photo shows model wearing mittens to dramatize the remarkable facility of locating and selecting the new magnetic card — MAGNE-TAB.

DATA . . . yours for the asking

For your convenience in obtaining pertinent and helpful information on the latest equipment, forms, services and related products in the data processing field, we direct your attention to the following free literature available from the manufacturers. Circle the numbers pertaining to the literature you wish to receive on the Reader Service Card appearing elsewhere in "DP."

ORIGINAL DOCUMENT PROCESSING is the title of a new Cummins-Chicago Corporation 16 mm film available for viewing by all banks and financial institutions. The 16 minute film shows the company's electronic equipment for processing checks, money orders, payment coupons, deposit tickets and the like; featured is the Perf-O-Sorter, Cummins' latest equipment.

Circle No. 70 on Reader Service Card.

CHECKS printed in magnetic ink are covered in a brochure just published by the C. E. Sheppard Co. Division of Yawman & Erbe Manufacturing Company. The purpose of the brochure is to assist banks and depositors by providing them with a new design service for MICR checks.

Circle No. 71 on Reader Service Card.

"TRANSISTOR DIGITAL CIRCUITS" is a new EPSCO brochure describing their complete line of solid state transistor and magnetic components.

Circle No. 72 on Reader Service Card.

ZA-810 TIME CODE GENERATOR in a proposed Inter-Range Instrumentation Group time code is described in a data sheet put out by Electronic Engineering Company. This unit produces a 36-bit time code, reading days, hours, minutes and seconds in binary-coded-decimal form.

Circle No. 73 on Reader Service Card.

PUNCHED TAPE PROGRAMMER is explained in a new data sheet published by Anaheim Electronics Division of Electronics Engineering Company. This describes the TP-860 which uses standard one-inch teletype punched tape for automatic programming.

Circle No. 74 on Reader Service Card.

IBM's new literature includes:

BANKING: *"Commercial Loan Accounting at the County Trust Company,"* 24 pages.

Circle No. 75 on Reader Service Card.

FIRE AND CASUALTY INSURANCE: *"Industrial Indemnity Company Workmen's Compensation Insurance on the IBM Ramac 650 with Tapes."* 12 pages.

"Kansas City Fire and Marine Insurance Company Premium and Loss Distribution on the Ramac 305," 16 pages.

Circle No. 76 on Reader Service Card.

PRINTING AND PUBLISHING: *"Accounting and Cost Finding for the Printing Industry,"* 40 pages.

"Fawcett-Dearing Printing Co. Payroll and Job Cost Accounting with the Ramac 305," 12 pages.

Circle No. 77 on Reader Service Card.

PUBLIC UTILITIES: *"Digital Computation of Technical Problems Saves One Million Dollars,"* 24 pages.

Circle No. 78 on Reader Service Card.

GENERAL INDUSTRIES: *"Preventive Maintenance and Cost Control,"* 20 pages.

Circle No. 79 on Reader Service Card.

PORT-A-PUNCH, a portable pocket-size card punch, is described in a new brochure which also presents series of case histories.

Circle No. 80 on Reader Service Card.

EQUIPMENT LEASING: The Foundation for Management Research has a revised, 24-page study entitled: *"The Pros and Cons of Equipment Leasing for Smaller Manufacturers, Department Stores and Supermarkets"*. Single copies of the third edition are available free to business executives.

Circle No. 81 on Reader Service Card.

LABEL TEST RESULTS of comparisons between the use of roll and

fan-fold type labels have been released by Allen Hollander Co., Inc. Laboratory tests were conducted under actual working conditions at two different data processing installations. In the first test the fan-fold label saved 90% in set-up time; the second test indicated time savings up to 95% in comparison with the roll form label. The complete results are included in an "Able-Stik Automation/Labelation Idea Portfolio," which includes samples of the new fan-fold labels. Detailed examples of use are also given.

Circle No. 83 on Reader Service Card.

STORAGE FOR PUNCHED CARDS AND MAGNETIC TAPES is available in a wide variety of sizes and models according to a brochure recently published by Remington Rand Division, Sperry Rand Corporation. The brochure also illustrates a variety of available punched card filing guides.

In addition to the customary vertical punched card file, the brochure illustrates and describes the latest in mechanized filing equipment and the insulated units which protect cards from destruction by fire. Mechanized equipment includes the Kard-Veyer Unit and the Conve'-Filer Unit.

Several types of magnetic tape storage units are illustrated. These include the horizontal housing with individual bins which swing outward; two types of magnetic tape truck, one of which also provides housing; and divider type shelving.

Circle No. 84 on Reader Service Card.

"COMPUTERESE". Aware of the baffling technical jargon surrounding *"electronic brains,"* the Brown Instruments Div. of Minneapolis-Honeywell has published a pocket-size 22-page glossary intended to make computer language more intelligible to the layman.

The booklet, called *"Do You Talk 'Computerese?'"* and compiled by E. A. Murphy Jr., staff editor of the company's *"Instrumentation"* magazine, defines some 82 terms which the instrument producer's own engineers have helped to create in building industrial process computers.

Circle No. 85 on Reader Service Card

OUTPUTS ITEMS OF INTEREST FROM HERE AND THERE

BUSINESS EQUIPMENT SHOW

The first New York presentation of *The Business Equipment Exposition* will be held in the New York Coliseum April 17 through 21, 1961, it was announced by Office Equipment Manufacturers Institute.

All manufacturers of office, computing, and accounting machines, equipment, systems and related supplies will be invited to participate in this presentation of the latest products and services of the office equipment industry.

D. P. DIVISION MARKETING

The Data Processing Division of IBM announced that it will market the products of the company's Supplies Division.

Products of the division include punched cards, magnetic tape and other supplies used in the operation of IBM data processing equipment. The division maintains manufacturing and testing facilities in Concord, Mass., Dayton, N.J., Greencastle, Ind., Endicott, N.Y., San Jose, Calif., Sherman, Texas, Washington, D. C. and Minneapolis, Minn.

To handle the new marketing function, William L. Ellis has been named supplies marketing manager for the Data Processing Division. He was formerly an IBM district sales manager with headquarters in Syracuse, N.Y. In his new post, he will be located in White Plains.

PROGRAMMING ADVANCES NEEDED

Advances in high-speed computer technology have been *"just unbelievable"* over the past 20 years, but better methods of telling the computer what to do *(programming)* and better assistance from it for the mathematician are needed.

This was the message Dr. Herman H. Goldstine, director of mathematics research for IBM, delivered to some 300 computer experts and students at The University of Michigan.

Dr. Goldstine, a former U-M professor of mathematics, noted that the field had grown from about 25 people in World War II days to *"hundreds of thousands"* today. Likewise, computer capacities have increased tremendously, from a high-speed memory capacity of 20 words to tens of thousands of words, and computation rates are thousands of times faster.

Thus, Dr. Goldstine pointed out, *"it is pretty obvious"* that if computers are to operate at the rate of one computation per 1000 millionth of a second *(a millimicrosecond)*, then the limits to how big a computer can get is about six inches to a foot on a side—the length a signal can travel in a millimicrosecond.

While advances in technology have been *"unbelievable,"* advances in programming and mathematical theory have not kept pace, Dr. Goldstine noted.

BANK MANAGEMENT SIMULATION

A fascinating situation of *"Men and Machines"* was set up in Pittsburgh through cooperation between Mellon National Bank and Trust Company and The International Business Machines Corporation. IBM furnished the machines and Mellon Bank furnished the men to bring three new *"banks"* to Pittsburgh for a day.

The entirely new technique, called *"Bank Management Simulation,"* was developed by McKinsey & Co., Inc., Management Consulting Engineers, New York. IBM provided the analytical talent so the game could be programmed for a computer. It utilizes an IBM 650 computer to condense two years' banking decisions into a single day.

Three teams of three bank officers each started their banking operations with equal assets, capital and deposits. They did not compete against each other, but against the economy *"built into"* the computer. As they made their decisions affecting commercial loans, demand de-

posits, increasing and decreasing the number of officers, assignments of officers, loan rates, service charges, time deposits, real estate loans, consumer credit, advertising expenditures, and investments, the information was punched on cards and fed into the 650. The computer was programmed to calculate the effects of the decisions, apply results to the previous condition of the bank, and compute current quarterly income. A simple but realistic model of the economy was built into the simulation and, as it progressed, various economic factors fluctuated, as did required bank reserves and the Federal Reserve rediscount rate. The *"banks"* had no advance knowledge of the *"ups"* and *"downs"* of economic activity, but had to recognize various indicators encountered during the course of the action.

COMPUTER TO LINK CAMPUS BUILDINGS

An all transistorized remotely controlled computer capable of 50,000 computations a second will be installed in Carnegie Institute of Technology's Computation Center sometime next fall. One hundred and fifty times faster than its present equipment, the new Bendix G-20 high-speed data processing system will make Carnegie Tech's Computation Center one of the most advanced and completely equipped facilities of its kind, said Dr. Alan C. Perlis, head of the Computation Center.

In operation since 1956, the Carnegie Tech Computation Center has offered its facilities to faculty and students. In many instances, students have been able to utilize literally thousands of dollars' worth of computer time in their undergraduate and graduate projects. The center also serves as an instructional and research unit for techniques in digital computing and provides a low-cost facility for use by business, industry, and governmental agencies in the community.

The new system includes magnetic tape units that read and write at a rate of 120,000 digits per second, and 600 line-per-minute printers. It uses the fastest punched paper tape and card accessories now available and is acceptable to any units developed in the future.

RCA 501 KEEPS INVENTORIES

An advanced electronic data processing system is providing daily control of finished goods inventories at the General Tire & Rubber Company's three plants and thirty warehouses throughout the United States.

The task is handled by an RCA 501 now in operation at the company's Akron, Ohio, headquarters. It is reported to be the first all-transistorized system to go into operation in the rubber industry.

With closer control of stock on hand, General Tire is in a better position to make shipments more promptly in response to market changes.

The system correlates daily inventory, billing and shipping reports, and is capable of processing all file operations in a daily average of 2,000 shipments.

The system is expected to supply management with more than a hundred sales analysis reports each month for tighter control of nationwide finished goods inventory.

MOORE PLANT

Moore Business Forms, Inc. is to build a new plant in Charleston, Ill. for the manufacture of business forms. The plant is scheduled for completion early in 1961.

SELF-IMPROVING MACHINES

A self-reproducing machine which can improve succeeding models of itself is theoretically possible, according to a mathematics professor lecturing in a unique two-week course on computers at The University of Michigan.

Prof. John Myhill of Stanford University told the class the self-improving series of machines would each be built of three parts — a builder, an instructor and a computer.

By telling the original machine, built by man, to reproduce itself and improve its *"offspring,"* the machine would produce a better version of itself, Professor Myhill said.

Each succeeding machine would be better than its predecessor in that its computer would be faster and more efficient. Improvements mainly would come in through its devising better circuits, since the machine would be limited to those parts made available to it — the same parts of which the *"adam"* of these machines consisted.

Besides reproducing and improving its successors, the automata Professor Myhill has in mind would also prove theorems. The increasingly better descendents would prove more theorems and would carry out more computations than their ancestors.

The idea of self-reproducing machines itself is not new, having been pointed out by the late John von Neumann and others. The idea of a self-reproducing and self-improving machine has never been published before, according to U-M computer experts.

MICROWAVE LINK FOR EXPERIMENTAL PURPOSES

The Advanced Systems Development Division of International Business Machines Corporation announced plans to establish an experimental microwave communication network. Its purpose is to study new data transmission techniques.

The IBM division has applied to the Federal Communications Commission for an experimental research license to transmit between Alpine, New Jersey and three other sites in northern Westchester County at Yorktown.

Experimenting with the network by transmitting data in various forms, engineers from the division expect to advance IBM Tele-Processing efforts. This involves transmitting and processing business and scientific data between different locations.

J. A. Haddad, general manager of the division, emphasized that the proposed microwave network would be used solely for experimental research purposes by the company.

"We are establishing this network so engineers can obtain first-hand knowledge by planned experiments with microwave, or wide band radio signals, because this transmission method offers great potential for data communication," Mr. Haddad said.

The experiments will center in four broad areas of interest, including path phenomena, modulation and multiplexing, non-manned repeater station operation and system considerations.

ASSISTANT DIVISION MANAGER

STANLEY A. LAWRENCE has been named Assistant Division Manager — Special Projects for the Collins Radio Company, Western Division. In his new post, Lawrence will serve as a consultant to management and customers on application of data communications systems to business and industry. He will also carry out special assignments in the systems and procedures field.

Lawrence has been with Collins for 17 years, most recently as Corporate Director of Management Services at the company's headquarters in Cedar Rapids, Iowa. He has held a number of other key administrative posts since he joined Collins in 1943 as Manager of Tabulating.

DOCUMENTATION INC.

JOHN S. SAYER, nationally-known industrial and management engineer, has joined Documentation Incorporated, Washington, D. C., as General Manager. As General Manager, Mr. Sayer reports to Dr. Taube, President, and Eugene Miller, Executive Vice President. Mr. Sayer will take direct charge of the administrative affairs of the company and will supervise the many areas of the company's operations, including systems studies, systems engineering, and data processing operations.

Organized in 1951, Documentation Incorporated is a veteran R and D firm in the nation's capital and also a pioneer in data storage and retrieval. The firm provides data information services for science, military, and industrial uses.

VICE PRESIDENT

The Board of Directors of Tech Panel Co., Inc., of Kirkwood, N. Y., has announced the appointment of DON D. KRIEBEL as Vice President in Charge of Sales. The move was made as a part of Tech's long range plan to bring improved service on control panels and wires to data processing installations throughout the country.

Mr. Kriebel has a broad background of experience in the data processing field, gained during more than 12 years with IBM in the Akron, Ohio area. During this time, he served in both sales and engineering capacities. He is a graduate of the Bliss Electrical School of Takoma Park, Maryland, where he later taught electrical theory and drafting. While with IBM, he graduated from their Engineering, Technical and Data Processing Schools.

SYSTEMS & PROCEDURES MGR.

J. J. DRURY has joined American Thread as manager of Systems & Procedures. A career man in this field, Mr. Drury has most recently been with Random House, Inc. Previous to that he coordinated all office services at the Boy Scouts of America headquarters in New Brunswick, N. J. Earlier he served as methods analyst for American Car & Foundry and for Johns Manville Co.

AT REMINGTON RAND

JOHN C. CROYLE has been named director of customer services of the Remington Rand Univac Division of Sperry Rand Corporation. His area of responsibility will include customer services for Remington Rand's Univac punched card as well as electronic data processing service groups.

Mr. Croyle has spent the last twenty-five years with International Business Machines Corporation, in the field of customer services.

He received his B. S. degree in electrical engineering in 1934 from Bucknell University. He also studied at the John Huntington Polytechnical Institute in Cleveland. He is a member of the American Institute of Electrical Engineers and the Institute of Radio Engineers.

MARKETING DATA PROCESSING PRODUCTS

To market new timing, data processing, and other products, the Electronic Engineering Company of California, Santa Ana, Calif., has appointed two new sales representatives for the Eastern U. S.

First to be appointed is the firm of White Sales Company of Needham, Mass. PETE WHITE heads the organization. In the New York - New Jersey area, EECo is being represented by the Kenneth E. Hughes Company, Union City, N. J. The organization is headed by KENNETH E. HUGHES, president. Both of these organizations also represent the Engineered Electronics Company, production subsidiary of EECo., in their respective territories.

In California, Anaheim Electronics Division products are marketed by the Key Electronics Company of Los Angeles, WINSTON KEY, president.

PHILCO SIERRA DIRECTOR

The appointment of JOSEPH ROBERT LEWIS as Director of Engineering for the Sierra Electronic Division of Philco Corporation was announced by W. D. Feldscher, division vice president and general manager. Mr. Lewis received his engineering degree in 1935 from the University of Pittsburgh. He is a member of the Institute of Radio Engineers.

NEW QUARTERS FOR GPL

GPL Division of General Precision, Inc. has relocated its West Coast Sales and Service headquarters from Pasadena to Van Nuys, California, announced J. M. Kees, manager of the organization's Los Angeles Regional Office.

BURROUGHS' INTERNATIONAL

E. G. WALLACE, who has been general sales manager for Burroughs International Division since 1954, has been named president and managing director of the firm's new company in Switzerland.

The new company, Burroughs International, S. A., will have headquarters in Fribourg, Switzerland, and will assure support and guidance to Burroughs overseas manufacturing and marketing organizations serving the western European areas, Middle East, Africa and India. The staff will be composed of veteran manufacturing and marketing teams from the International Division, Burroughs corporate staff, and from European operations.

SDC

Dr. WILLIS C. SCHAEFER has been appointed System Development Corporation's Washington representative. Dr. Schaefer joined the RAND Corporation in 1953 and then went with SDC when it *"spun off"* from RAND in 1956. Prior to his selection to head the Washington office, Dr. Schaefer was Assistant Head of SDC's Special Development Department where his specialty was air defense/air traffic integration.

He received his Ph.D in Psychology from the University of Chicago in 1940 and was on the faculty of the University of Maryland for five years. He then was Director of Research at the Institute for Research in Human Relations where he performed applied psychological research on projects dealing with Navy aviation mechanic selection, pilot selection and jet aircraft safety.

CONFERENCE CHAIRMAN

Mr. DON G. MITCHELL, president of General Telephone and Electronics Corp., has been named General Chairman of the committee arranging for the Fall Instrument-Automation Conference and Exhibit of the Instrument Society of America, to be held in New York Coliseum during the week of September 26-30. The 15th annual meeting of the Society will be held at the same time. More than 30,000 visitors are expected at the exhibit.

A. B. DICK APPOINTMENTS

Appointment of WILLIAM C. BISHOP as Sales Promotion Manager — International at A. B. Dick Company has been announced by Kenneth B. Marble, Sales Promotion and Advertising Manager. Bishop formerly had been Advertising and Sales Promotion Manager at Brunswick International C. A. He will be responsible for development, execution and coordination of all promotional programs in international markets for A. B. Dick products.

WILLIAM F. SOUDERS has been appointed Sales Manager, Azograph-spirit products. Azograph-spirit sales formerly were grouped with A. B. Dick photocopy sales under the same manager. Increase in sales and an expanding line of products forced the reorganization. Souders most recently served as staff assistant to the general sales manager. Prior to that he was a national accounts representative for A. B. Dick.

BURROUGHS DIRECTOR

HENRY T. BODMAN, president of the National Bank of Detroit, was elected a director of Burroughs Corporation at the firm's annual meeting in Detroit.

A native Detroiter, Bodman is a graduate of Hotchkiss School and an honor graduate of Princeton University with a B. S. degree in mathematics in 1928. He began his business career in the fall of 1928 with Guardian Detroit Bank. In 1933, he joined the National Bank of Detroit and was successively promoted to assistant cashier, assistant vice president and assistant trust officer and then to vice president in charge of trust investments. Promoted to general vice president in 1950, he was named to the board of directors in 1953, and elected president in 1958.

Other directors re-elected at the annual meeting include Ray R. Eppert, president; Harold S. Chase, Walker L. Cisler, Thomas G. Long, Charles H. Percy, Charles Sawyer, and Burroughs vice presidents Ray W. MacDonald, Kenneth C. Tiffany and Dr. Irven Travis.

STANDARD REGISTER ANNOUNCEMENTS

DEAN B. McCOID has been named San Jose District Sales Manager for The Standard Register Company. A graduate of Dickinson College, Carlisle, Pennsylvania, Mr. McCoid served with Standard's Oakland sales office as a general sales representative.

CHARLES F. OLWELL, formerly manager of the New York City Knickerbocker District for Standard Register, has been named manager of the newly formed White Plains District.

C. FRANK COACH, formerly Mid-Atlantic Division supervisor of market development and research for Standard Register, has been named Baltimore District Sales Manager.

RCA MANAGERS

JOHN P. MACRI has been named manager of Custom Project Sales for RCA's Electronic Data Processing Division. Mr. Macri was formerly a communications engineer in commercial sales with the Bell System, New York.

T. R. McKEE has been appointed as manager of Data Handling Equipment, reporting to Mr. Macri. Mr. McKee formerly was engaged in communications planning as a civilian employee of the U. S. Air Force at Norton Air Force Base in California.

■ ■ ■

Seen in Print

COBOL — COMMON LANGUAGE FOR COMPUTERS, Management and Business Automation, March, 1960.

A universal computer language moved one step closer to reality with the announcement of COBOL *(Common Business Oriented Language)*, a business language expected to be common to virtually all makes and models of electronic digital computers. The new source language system will permit programmers to use English words, statements, sentences and paragraphs in communicating instructions to computer systems.

COMPUTER OPERATION BY A CPA FIRM by Gerald R. Broucek, Journal of Accountancy, June, 1960.

This is an account of the experience of a CPA firm with a rented computer system, suitable for processing punched paper tape prepared as a by-product of the normal bookkeeping procedures of clients. It was found possible to provide the service at relatively low cost on a profitable basis.

SIR SIMON WARS ON NEEDLESS PAPER by Blake Clark, Office Management and American Business, June, 1960.

"We refuse to pay fivepence to remove the safe to recover sixpence that rolled under it," says British businessman, Sir Simon Marks, about needless business paperwork.

DEVELOPMENT OF OFFICE MANAGEMENT IN EUROPE by O. Richard Wessels and Edward J. Gauthier, Office Executive, June, 1960.

An article based on the experiences and findings of two management specialists who spent some time in Europe as participants of one of the programs of the European Productivity Agency.

RESEARCH APPROACH IN MANAGEMENT CONTROLS by Alan J. Rowe, The Journal of Industrial Engineering, May/June, 1960.

"An important challenge awaits the business manager of the future. In spite of expert advice on business operations and the availability of computers, management decision making and control are still extremely difficult and complex tasks; and with the inevitable shift from emphasis on intuition and judgment to management skills, the role of managers will become increasingly important."

NEW APPROACHES IN AUTOMATION by Charles C. Chase, Office Executive, May, 1960.

One of the serious drawbacks to the progress of automation has been the exorbitant number of man hours required to adapt the new system to a company's particular situation and the high cost of installation. Today, through the cooperative efforts of the customers and equipment suppliers, the enormity of this problem is rapidly being reduced.

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BOOK SHELF

MATHEMATICAL PROGRAMMING by N. V. Reinfeld and W. R. Vogel, Prentice-Hall, Inc., Englewood Cliffs, N. J., 1958, 239 pages, $8.00.

This is a *"cook-book"* approach to linear programming, presented in an understandable and non-mathematical manner. Starting with the most simple distribution method, and going through the Simplex method and an approximation method by Vogel, it gives the step-by-step process required to find optimum solutions to given problems. There is almost no discussion on the setting-up of problems for solution, but this weakness of the book is in part covered by a large chapter (*over one-quarter of the book*) on case studies in the use of linear programming. A very brief description of a computer-method of solution is included.

Although easy to read, *Mathematical Programming* does not satisfy the requirements of a basic text on the subject, principally because of the lack of attention to the formulation of problems, and also because no background is attempted; the book is void of proofs, and the authors seem to fear that even mention of the word *"algebra"* will send their readers scurrying. Finally, the title is misleading. The authors point out that the methods are applicable to more than just linear equations, hence they feel Mathematical Programming is a more accurate description of the subject; however, Linear Programming as a field of mathematics is well known, as are its extensions to non-linear equations, and the field of mathematical programming would seem to cover much more than that.

For those desiring a ready reference to the method of solutions of linear programming problems, this book offers much.

THE COMMON MACHINE LANGUAGE for Mechanized Check Handling, Bank Management Publication 147. American Bankers Association, 12 East 36 Street, New York 16, N. Y., 1959, $1.00.

Have you been wondering about those new odd-looking symbols on checks you've handled? Or have you had unanswered questions about MICR, the magnetic-ink-character recognition which is on the way in banking? Although this booklet may not give you *all* the answers, it will not give you any *wrong* ones, for here are the final specifications on the characters and fields, straight from the people who made the specifications. Besides all the technical information, they have included a little on the history of MICR, and enough discussion to give an idea of how the banks are going to use their common machine language.

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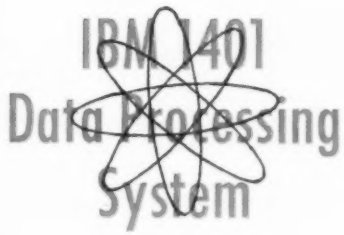

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Contact: Wm. A. Kushnick, ISA, 313 Sixth Ave., Pittsburgh 22, Pa.

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Systems & Procedures Association International Systems Meeting
Hotels Commodore and Biltmore
New York, N. Y.
Includes Electronic and Systems Seminars
Contact: ISM, c/o Otis Elevator Co., 44 Wells Ave., Yonkers, N. Y.

Oct. 20-22

Institute of Management Sciences, 7th International Meeting, Session on Computers in Simulation.
Hotel Roosevelt, New York, N. Y.
Contact: James Townsend, 30 E. 42nd St.
New York 17, N. Y.

editorial

THE NATIONAL MACHINE ACCOUNTANTS ASSOCIATION has growing pains. Year after year this group of punched card and computer experts has shown an unharnessed growth that made the crest of the ever increasing data processing popularity. Now that American business is catapulting to an almost universal acceptance of machine accounting, automatic transmission and more sophisticated data processing techniques, the N.M.A.A. is faltering.

The attendance at the San Francisco convention *(June 1960)* was about three or four hundred less than the anticipated 1500. Those who attended were disappointed to find that more than half of the seminars were conducted by manufacturers or suppliers of data processing products or services. This captive audience provided a fine opportunity for the sales organizations to display their experienced and talented representatives but many of the association members who submitted expense accounts for several hundred dollars were not as satisfied with the scope of the program as they would have been if there was less emphasis from experts who sell, and more emphasis on experts who use.

The exciting city of San Francisco and the interesting side trips that many attendees made were excellent for those who combined some vacationing with business but the distance and, of course, the fare made attendance prohibitive to many. The delegates selected New Orleans, another interesting but out of the way location, for a future convention site.

The lack of press coverage that such a convention deserves is due to the planned inadequacy of the facilities provided. The national policy is to prevent release and publication of any material so that the N.M.A.A. convention book may have an exclusive right to available presentations. In our judgment, this seems to be in conflict with the basic purpose of the organization—the dissemination of information to data processing management personnel.

It is the overwhelming opinion of most people we speak to that two major changes in convention policy are essential to their renewed success.

1. Each annual convention should be held in a major city which is conveniently located, such as Chicago.
2. All conventions should be managed by a permanent member of the National Executive Committee rather than by an inexperienced group from the host city.

The National Machine Accountants Association is growing from boyhood to manhood. Within the next few years, it will be flexing its muscles as a mature group that management will look to for leadership. ■

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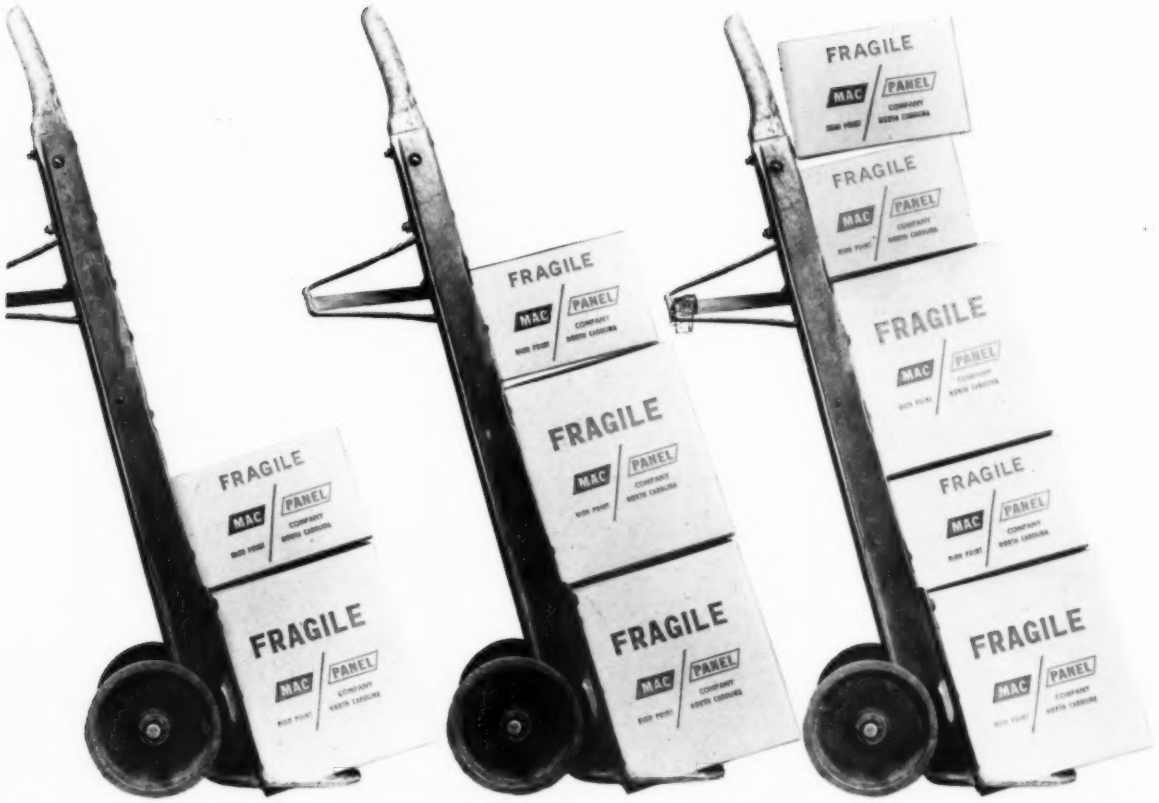

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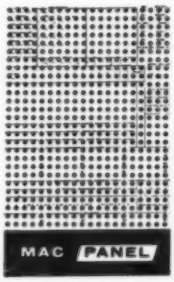

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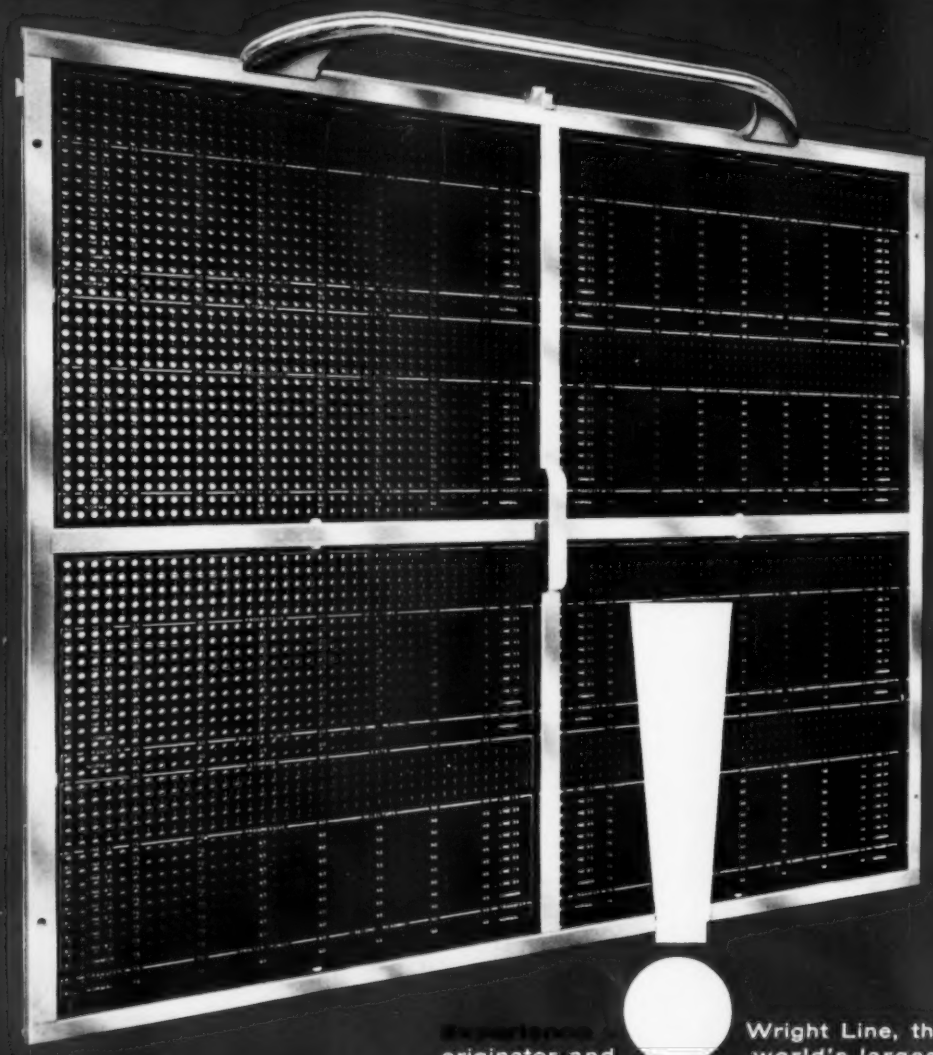

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